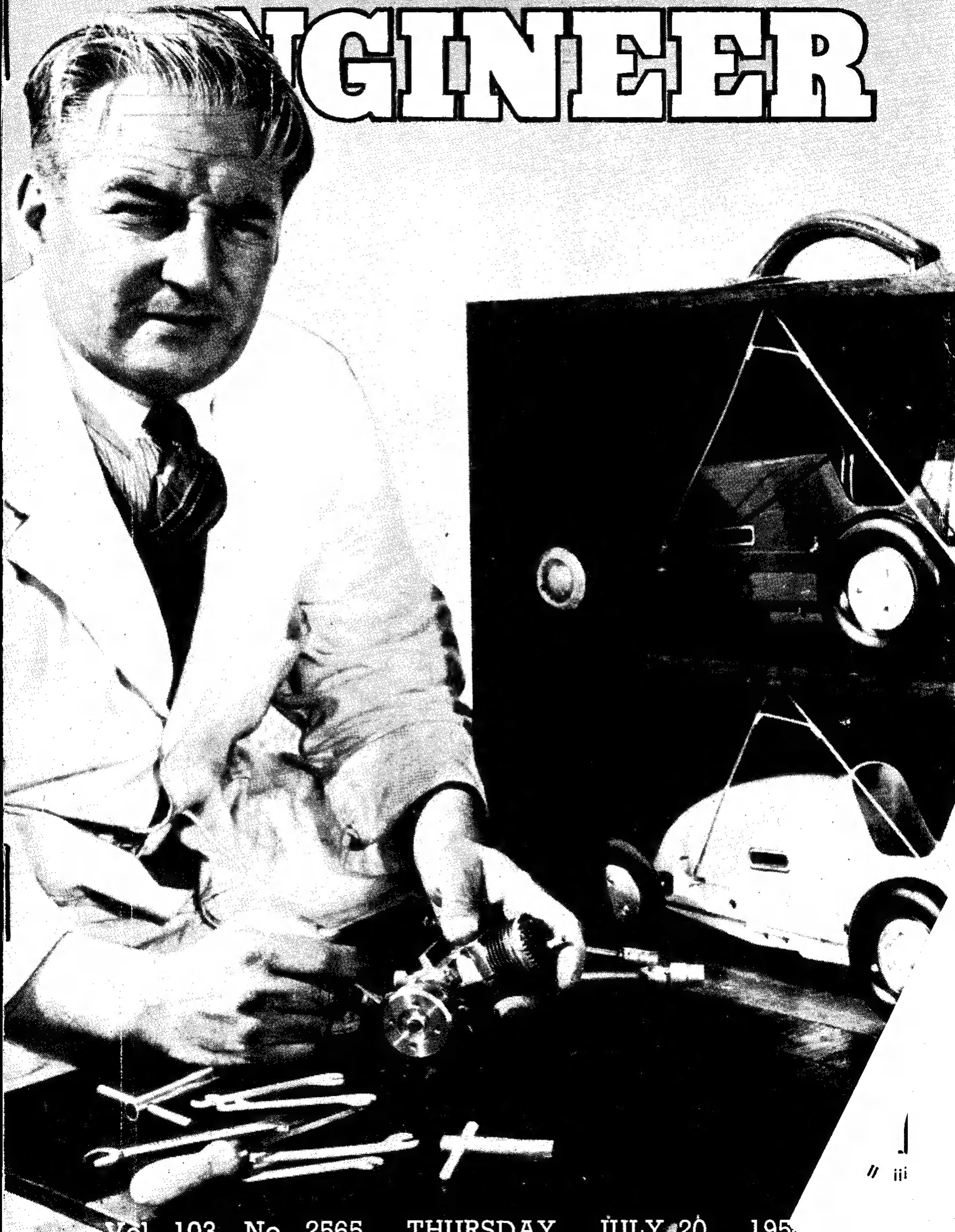
THE MODEL ENGINEER



Vol. 103 No. 2565 THURSDAY JULY 20 195

The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

20TH JULY 1950 VOL. 103 NO. 2565

SMOKE RINGS

Our Cover Picture

● MINIATURE CAR racing has gained a strong foothold in Australia, where several clubs have been formed in the capital cities.

The photograph this week shows Mr. C. W. Ballem of Victoria giving attention to his spare engine, while in the right background is his portable garage which houses two very business-like-looking cars. Note the short piano-wire bridles and the fold-down front which acts as a workbench for track servicing and maintenance.

SOS

● WE HAVE received from Mr. J. Longson, hon. secretary of the Chesterfield and District Model Engineering Society, an appeal for help in tracing an exhibit which was on show at the society's recent exhibition. It is an unfinished road traction engine tender (Allchin) made of brass, and was being constructed by Mr. W. J. Hughes of Sheffield. At the close of the exhibition, this tender could not be accounted for, and all efforts to trace it have, so far, failed. There is a possibility that it was misdirected, and if this appeal should come to the notice of any reader who has lately received, or knows of the whereabouts of a partly-finished brass tender for a model traction engine, which does not belong to the person concerned, would he please communicate with Mr. Longson, c/o 78, Heaton Street, Chesterfield, as soon as possible.

"M.E." Exhibition Prize Donation

● MESSRS. VERNON SMITH & SONS LTD., of 346 King Street, Hammersmith, have kindly donated a 1/3-h.p. single-phase electric motor, to be awarded at the "M.E." Exhibition, 1950, as a prize for the best home-built stationary steam engine and boiler.

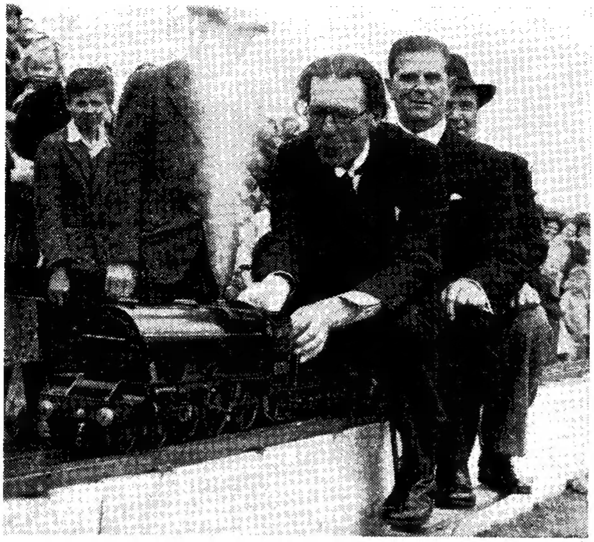
New Societies

● WE LEARN that the Southgate and District Model Power Boat Club is firmly established. The hon. secretary is Mr. A. R. Warren, 50, Berkshire Gardens, Palmers Green, London, N.13, who thinks that many readers in that area would like to know of the existence of the club; he will be pleased to give all enquirers full particulars and information.

Another recently-formed society is the Dover and District Model Engineering Society, the hon. secretary of which is Mr. Harry E. Q. Turner, 62, Markland Road, Dover. The first president is the Hon. Charles E. North, B.Sc.(Eng.), A.C.G.I., A.M.I.Mech.E.

We offer our sincere good wishes to both these new ventures, and we hope to hear more of each of them, in due course.

The New Track at High Wycombe



● IT IS almost exactly four years ago that the High Wycombe and District Model Engineering Society approached the local municipal authorities regarding the possibility of installing a passenger-carrying track in the Rye meadows. Since then, negotiations have been in progress, subject to the prevailing difficulties of the times, but culminating happily in the completion of a fine track which should add much to the amenities of the town for many years to come. The track was recently formally opened to the public by His Worahip the Mayor of High Wycombe, Councillor John Timberlake, assisted by Mr. E. Rolph, who was chairman of the Open Spaces Committee when the scheme was first proposed, and Mr. J. N. Maskelyne, who had been invited to drive the first train. Mr. G. H. Kaye, to whom the gratitude of all concerned is due for having generously financed the scheme in its early days, was unavoidably absent.

The track has been built by a team of members of the society who, at their own expense and in their spare time, have attended at regular intervals for the purpose. The rails are laid on sleepers which are bolted down to a continuous concrete base about 2 ft. high, of approximately oval form and 1/6 of a mile in extent. At present, $3\frac{1}{2}$-in. and 5-in. gauges are available, but the club will welcome any owners of locomotives of these sizes from any other club; the hon. secretary, Mr. H. A. Gibbs, 159, Gordon Road, High Wycombe, will be pleased to assist in making arrangements for visitors from other clubs.

Thus, High Wycombe is to be added to the growing list of places where municipally-sponsored tracks are now in operation. We have no doubt that this latest venture, which is to be further developed, in due course, by the provision of a boating-lake and, possibly, a car-racing track, will fulfil its purpose in the able hands of the enthusiastic model engineers of the district.

Myford Service in Canada

● MR. L. MOORE, of the Myford Engineering Co. Ltd., sends us news that his company, which needs no introduction to our home readers, is actively engaged in extending its regular trading connections in Canada. The principal depot is at Hamilton, Ontario, in charge of Mr. Stuart Jackson; but arrangements for distribution in other districts have been made with the following traders: In the Maritime Provinces, Messrs. E. S. Stephenson & Co. Ltd., St. John's, New Brunswick, and in the Prairie Provinces, Messrs. Consolidated Industries Ltd., 229, Main Street, Winnipeg, Manitoba.

In adidition to this, the well-known T. Eaton Co. are selling the ML7 lathe from their chain stores right across Canada, and Myford lathes are being sold to fifteen depots of the Royal Canadian Navy for use by Naval Training Units.

This is good and interesting news, especially at the present time; not only do the arrangements help to earn more dollars for Britain, but they ensure that our Canadian readers are able to purchase, from stock, British-made lathes of good quality at keen prices.

An Exhibition for Exmouth

● THE EXMOUTH and District Model Club will be holding a non-competitive exhibition on August 4th and 5th next. It will be staged at the Y.M.C.A., Victoria Road, Exmouth, and will consist of a display of all types of models. Mr. R. D. N. Salisbury, the hon. secretary of the club, extends a hearty welcome to any modellers who may be spending their holidays in Exmouth.

Miniature Locomotive Trials Data

● THE J. & E. HALL MODEL ENGINEERING SOCIETY recently held some miniature locomotive trials which seem to have been not only well-attended but to have provided enjoyment to all concerned. Mr. C. W. Harris, the hon. secretary, informs us that no fewer than nineteen locomotives took part, keeping the stewards busy from 10 a.m. until 6.30 p.m. on what turned out to be a non-stop competition. Two of the competitors failed to stay the course, but the other seventeen each completed the ten laps of the track, which was, apparently, the specified distance to be run. Eight of the locomotives were for 5-in. gauge, the rest being for $3\frac{1}{2}$-in. The winner was *Ida*, owned by Mr. Cook, of the South London club, and driven by Mr. Philpott. Second place was gained by Mr. Sparkes with his freelance 0-4-0 driven by Mr. Burroughs, of the Orpington Club. Both engines are for $3\frac{1}{2}$-in. gauge.

The performance was assessed on a formula involving the total load hauled, the time taken per trip and the theoretical tractive effort of the engine; but our copy of these particulars does not indicate how the results were calculated; neither is the type of the locomotive given, which omissions are unfortunate.

L.& N.W.R.—"Hutton Branch"

by Lt.-Col. H. Simpson

HAVING always been a rabid L.N.W. "fan," I have bestowed on my $3\frac{1}{2}$-in. gauge garden railway the above title, and I may say that everything about the line is made as North-Western as possible.

I started a $3\frac{1}{4}$-in. gauge line during the 1914-18 war while I had a job in the Army at home. The line has been moved and re-laid several to a height of about 4 ft. 6 in. above the ground at the lower end. As this was rather terrifying to some passengers, and as I thought the introduction of a gradient would add to the interest of the locomotive work, I lowered the rails by 1-ft. at the lowest point, with a gradient of 1 in 100 up in each direction from that point. This has proved a great success in every way.

Photo by] [*J. S. Dalton, Penrith*

A good load for "North-Western"

times in consequence of the moves to which one is subject during service in the Army.

Before coming to Hutton, near Penrith, I was for twelve years at Warwick-on-Eden, near Carlisle, and until just before the move here, had the line laid on the ground, using old railway sleepers as "ballast" to which to tack down the scale sleepers. Before the last move I had already begun to lay a track on posts 2-4 ft. above the ground, so as to be able to carry "full-size" passengers. By that time (20 years ago) $3\frac{1}{2}$-in. gauge locomotives had been developed to such an extent, principally owing to the efforts of our old friend "L.B.S.C.", that scale model rolling stock was far too much child's play for them.

My chief interest has always been in the steam locomotive and this naturally led to the construction of a track on which the locomotives could show what they could do. My present track is 500 ft. continuous, in a paddock or "garth" adjoining the house. It was first laid dead level, but this involved raising the rails

Shortly after coming here I changed the gauge to $3\frac{1}{2}$-in. as being more "standard," and altered my rolling stock accordingly.

The track is supported on 3 in. × 3 in. wooden posts. Originally I used 3 in. × 1 in. road bearers, similar to fencing posts, and "half-jointed" the ends, bolting the joints through posts. The inner and outer joints were staggered. I found the weather had a bad effect on the joints. Since the last war the whole track has been relaid with 4 in. × 1 in. road bearers, the ends of which are "butted" together and secured by 4-in. × 3-in. × 24-in. fishplates between them. It has also naturally been found necessary to employ out-of-scale sleepers, on account of the heavy loads.

Originally, I employed scale model permanent way bull-headed brass rails, chairs, and hardwood keys, but I found this permanent way unsatisfactory, principally because the little chairs did not hold the rails upright. On the advice of "L.B.S.C.," I relaid the line with flat-bottomed brass rails, secured with brass

screws and washers. At the joints I have recently introduced small strips of brass, 1 in. long, four to each joint, one inside and one outside each rail with a screw each end. This, I think, makes for better joints. (See Fig. 1).

This permanent way has proved very satisfactory, and incidentally is in accordance with the latest practice. To enable a hay-mower to get inside the track I have an 8-ft. section which can be lifted out. This is constructed as shown in Fig. 2.

The wire is double throughout, and is tightened by a "Spanish Windlass."

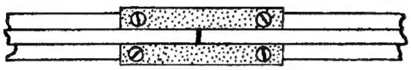


Fig. 1. Joints of rails

At another point near the principal station, is another short detachable section for ordinary running (driver and passengers sit astride on heavily built wagons with foot rests about 18 in. from the seats. The driver's wagons are four-wheeled, the passenger coaches have each two four-wheel bogies).

I have constructed two sidings for the accommodation of scale model rolling stock and for "visiting" locomotives, etc. These are connected to the main line by a set of points which can be inserted when the "plain" detachable section is taken out. There is a fixed set of points leading to the two sidings.

Two years ago we nearly had a very serious accident. My son was driving one locomotive at speed round the line while I was raising steam in the other locomotive in one of the sidings. Having got my locomotive in steam, I removed the "plain" section from the track, and was preparing to insert the "point" section, when my son came charging round the curve at six or seven m.p.h. He was just in time, digging his heels into the ground (luckily the track is only about 2 ft. above ground at that point) to pull up short of the gap.

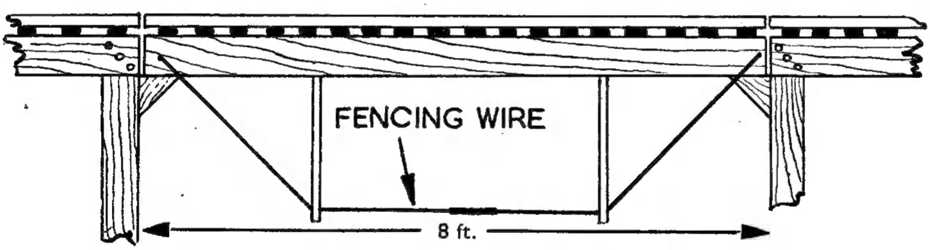


Fig. 2. Removable "viaduct"

This gave us a new idea—signals! So we constructed and erected a distant and a home signal—the distant about 15 yards in advance, and the home at the gap. These signals are as nearly as possible of L.N.W.R. pattern. The arms are of sheet iron, pressed in a special mould to give them the corrugations. The spectacle plates have red and green glasses, and brackets are provided to carry ordinary electric bicycle lamps.

The effect at night is very inspiring!

The signals are actuated by the plain detachable section. When that is in position they are both pulled to the "off" position. When it is out, whether or not the point section is in, they return to "on." I found "Barney's" tobacco tins just the thing for casting lead counter-weights. However, these first two signals led to other ideas.

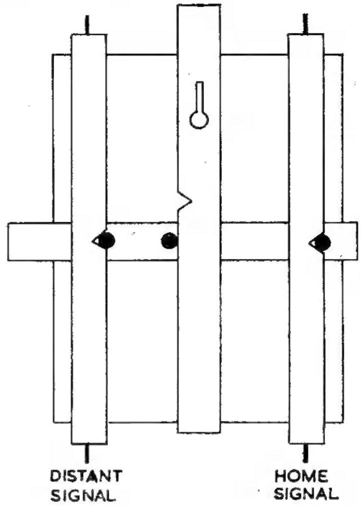


Fig. 3. Interlocking frame. Position with "detachable section" out. A stud on bar on the section of track engages with the slot on centre locking bar

Through a kind friend, and two or three gentlemen connected with the L.M. Region, British Railways, who were extremely kind to me, and entered in the scheme with great interest, I have been able to purchase three "time-expired" L.N.W.R. block instruments—up and down and three separate bells. I have divided the track into three sections, and have wired the instrument and bells to work "single line, one way only." These frames are erected to represent signal boxes, with levers to work the signals, one home and one distant at each box. The "boxes" are named "Penrith," "Shap"

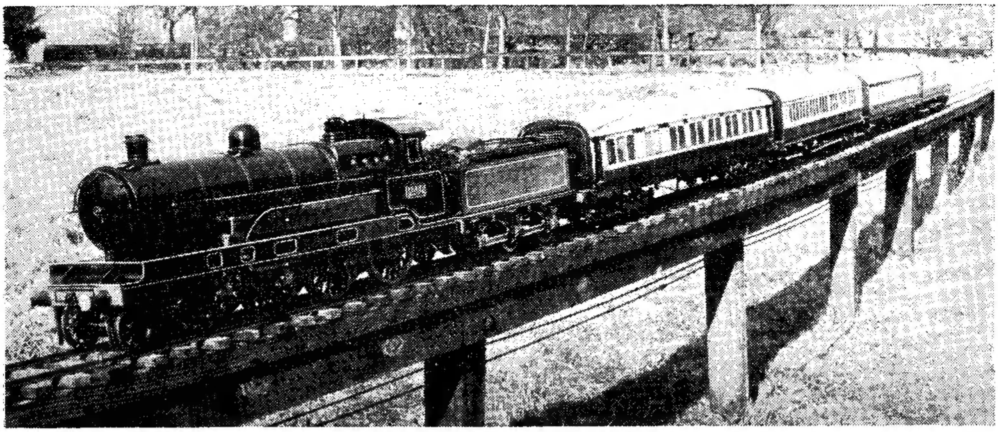


Photo by] [*J. S. Dalton, Penrith*
General view of track

and "Tebay." Distant and home signals are interlocked in the frames. The wiring round the track is led to sockets on the frames, and plugs to correspond are wired to the block instrument and bells. A box is provided under each frame to hold the batteries—four Le Clanché cells for the needle circuit and four for the bell circuit. When it is required to operate the system, the instruments are easily carried out and plugged into the frames. The batteries remain in the boxes during the summer months. I have found difficulty in making the bells work and have acquired some copper wire to make a metallic earth, and hope the voltage in these circumstances will be sufficient. The needle circuits work well. I have had a lot of kind and useful advice and assistance from the signal inspector from Lancaster, Mr. Allsop, and the lineman from Penrith, Mr. Ken Wood.

I have constructed an interlocking frame, which is fixed to the post below the detachable section. This latter has a bar which engages with the centre locking bar of the frame. The other two locking bars are interposed in the signal lines. The result is that the detachable section cannot be removed when the signals are "off" and the signals cannot be pulled off when the detachable section is out, whether the point section is in or not. (Fig. 3.)

It was pointed out to me that the home signal, as will be seen from the photograph, did not protect the points properly. I removed it at once to a proper position further "in rear."

George the Fifth. She was built about 1925 by a firm now defunct, to the designs of a model

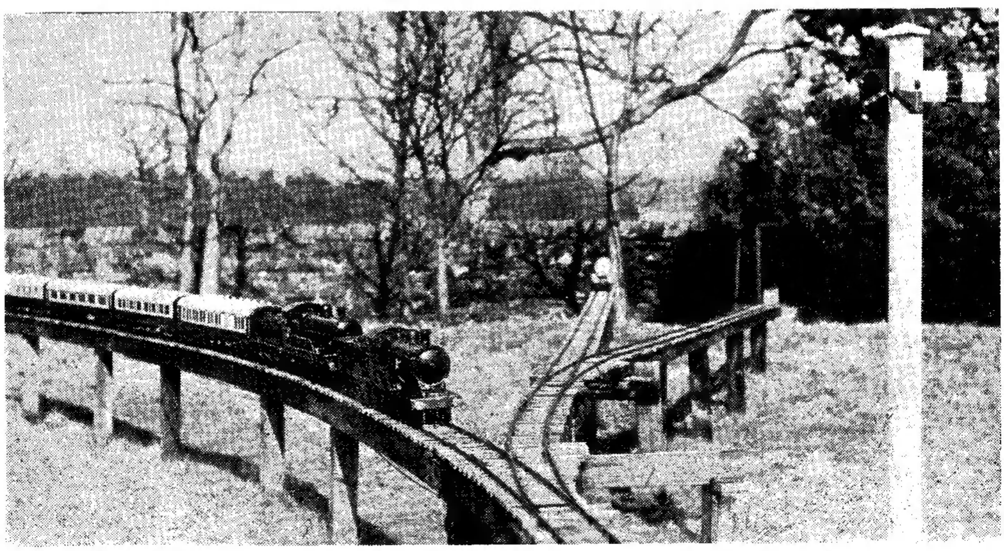


Photo by] [*J. S. Dalton, Penrith*
Points and sidings. The North-Western train double-headed. Mr. H. Glaister's half-built "Royal Scot" in the siding

engineer who has since passed away. She has been through many vicissitudes of fortune, alterations, renewals, and rebuilding, into which it would be superfluous for me to enter, as for some years her whole history, and her portraits, have appeared and been fully described in THE MODEL ENGINEER by my friend "L.B.S.C." The most important alterations have been the fitting of true Joy valve-gear, superheater and 1 3/32 in. cylinders in place of ¾ in. She is now a real locomotive, performs wonderfully and is a great pleasure to drive.

After the last war (1939-45) Messrs. Dick Simmonds and Co. built me a "Claughton." I call her *North Western* to perpetuate the memory of the old line, although *North Western* was one of the "Experiment" class.

She is complete with four cylinders, Walschaerts valve gear—two sets. The inside cylinder valves are actuated by rocking shafts from the outside gears, Belpaire firebox and two superheater elements.

Each locomotive has a very adequate eccentric water feed-pump on the driving axle, an "L.B.S.C." injector, and, as a last resort, a hand pump on the tender.

North Western has been round the track in 50 sec., as fast as I dared to go and she is capable of considerably greater speed.

The heaviest load so far has been to take 47 stone, plus tare weight of vehicles—1 driver's 4-wheel wagon, and two bogie wagons, round the track—including 100 ft. of 1 in 100.

For raising steam I used to employ a Wood-Milne motor footpump, a spare copper boiler as air reservoir to give a steady blast, and an extension chimney.

North Western has an adapter, to fit one of the water connections to which the footpump can be attached and a pressure raised in the boiler, so that the engine's own blower can be used. This is the most effective and expeditious method of raising steam, but I question whether it does not aerate the water and cause priming.

I have now an electric air blower used with extension chimney, which is worked by a long flex plugged into a socket in the house circuit. This raises steam rather more slowly, which is perhaps better for the health of the boiler. It also involves much less hard labour, and gives an opportunity to the driver to look around and lubricate his engine and attend to various matters.

Lubrication of cylinders in the case of each locomotive is effected by an "L.B.S.C." mechanical lubricator, an eccentric pump worked by a rod from the eccentric feed water pump.

I must make mention of my *North Western* train, which to me is a thing of beauty and joy for ever.

It consists of a first-third compo., a sleeping saloon, a dining saloon, and a 3rd compo, period about 1913, built by an old friend from drawings borrowed from Wolverton, and, of course, painted in the grand old colours—chocolate and white.

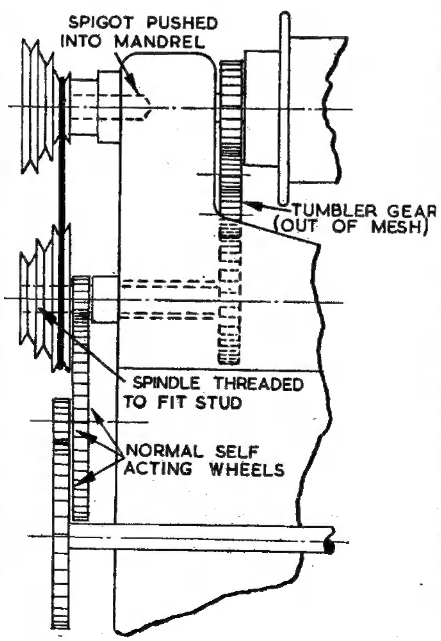
A Silent Automatic Feed

WELL, that's how it all happened:

Wife ill, daughter just home from night work at hospital, and a high-speed auto-feed turning job to be done in a hurry.

I walked into the workshop, kicked a piece of 4 × 2 which I had fallen over dozens of times, and then picked it up and looked at it with a new interest. Have you got a lathe with tumbler gears which make a noise like a horse-drawn mowing machine? I have.

The 4 × 2 seemed to glare balefully at me; with the glimmering of an idea, or perhaps with malice aforethought, I sawed off a 3-in. length, set it up in the 4-jaw chuck, and converted it into a 3-step V-pulley. This done, I found an old broom handle, cut off a 4 in. length, and turned up a spindle for the pulley, which I duly mounted in the same, and then pushed the spindle into the back end of the hollow mandrel. So far, so good.



I next cut another piece off the 4 × 2, 4 in. long, and setting this up, converted it into another pulley, this time making all steps ½ in. larger. This one I mounted on a screwed spigot, which I duly mounted on the first driver gear (you know, the one which usually has a 20-tooth wheel left on it until it is worn out).

Looking round for a suitable belt, I found a cello string to be almost ideal (does anybody want to buy a 3-string cello?).

On putting the tumbler gear into neutral, the result was a beautifully silent self-act, with a further two steps reduction, which I had always needed. Reverse? Well, cross the belt, of course! Yes, I know it needs a longer belt; well, sewing machine belting is only 6d. per ft.

Peace at last. Now I can get on with my work and listen to the radio at the same time.—

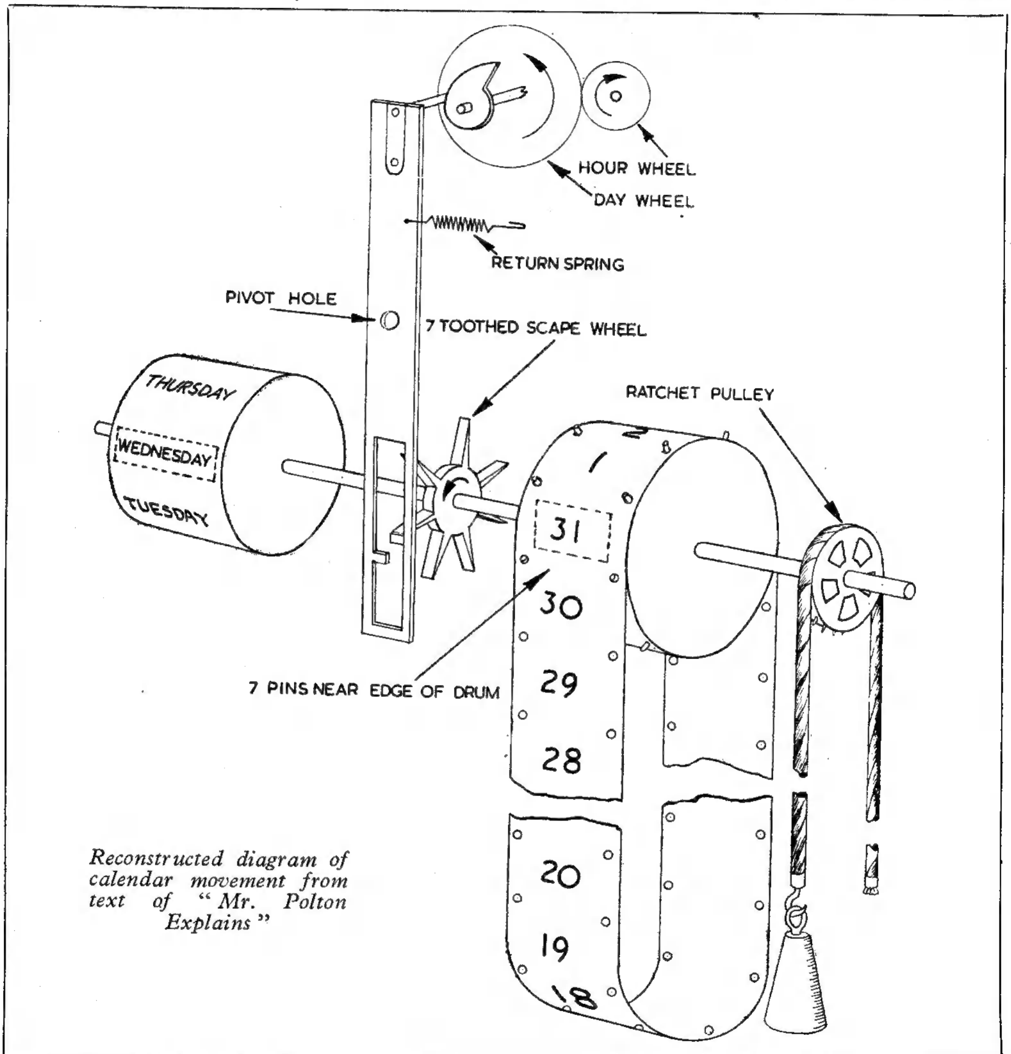
W. H. BOLTON.

A "Novel" Calendar Movement

by J. W. E. Message

MANY of us who find (or make) the time to read light literature, enjoy detective stories. We take them as they come—good, bad, indifferent, rejecting some as the interest flags, or perhaps struggling on in the hope that the tale will improve. Most of us have come across the mystery yarn in which the author writes a natural tendency is to shelve the book. After such an experience, how refreshing it is to read a mystery story with a technical theme in which the reader at once senses that the author's technical knowledge is sound!

Having recently enjoyed a novel in this category, the writer was intrigued by the description



Reconstructed diagram of calendar movement from text of "Mr. Polton Explains"

story with a technical theme and shocks the reader with the impossibility of some particular description or set-up, due to ignorance of technical matters. When the model engineer finds that the author's technical statements do not bear inspection, his interest wanes and the of a calendar movement "invented" by the chief character in the novel, and on completion of the story, recourse was made to pencil and paper in the endeavour to sketch the movement as described and to investigate its practicability. The result was highly gratifying, and in the hope

that it will interest readers of "ours," a sketch and description of the calendar movement appear herewith, by kind permission of the late author's executor. The title of the novel is *Mr. Polton Explains*, and is one of many novels written by the late Dr. R. Austen Freeman. It is, or was, published by Messrs. Hodder & Stoughton.

As a tribute to the late Dr. Austen Freeman, the following text is taken straight from the book, the dialogue being between Mr. Polton (in the first person) and his employer, Mr. Parrish. The subject is a "long case" or grandfather clock which is about to be overhauled.

"'And while you've got it to pieces,' he continued, 'perhaps you could manage to fit it with a calendar attachment. Do you think that would be possible?'

"I pointed out that it had a date disc, but he dismissed that with contempt.

"'Too small. Want a microscope to see it. No, no, I mean a proper calendar with the day of the week and the day of the month in good bold characters that I can read when I am sitting at the table. Can you do that?'

"I suggested that the striking work would be rather in the way, but he interrupted:

"'Never mind the striking work. I never use it. I hate a jangling noise in my room. Take it off if it's in the way. But I should like a calendar if you could manage it.'

"Of course, there was no difficulty. A modification of the ordinary watch-calendar movement would have answered. But when I described it, he raised objections.

"'How long does it take to change?' he asked.

"'About half an hour, I should think. It changes during the night.'

"'That's no use,' said he. 'The date changes in an instant, on the stroke of midnight. A minute to twelve is, say, Monday; a minute after twelve is Tuesday. That ought to be possible. You make a clock strike at the right moment; why couldn't you do the same with a calendar? It must be possible.'

"It probably was; but no calendar movement known to me would do it. I should have to invent one on an entirely different principle if my powers were equal to the task. It was certainly a problem; but the very difficulty of it was an attraction, and in the end I promised to turn it over in my mind, and meanwhile I proceeded to take the clock out of its case and bear it away to the workshop. There, under the respectful observation of Gus and Mr. Kennet, I quickly took it down and fell to work on the cleaning operations; but the familiar routine hardly occupied my attention. As I worked, my thoughts were busy with the problem that I had to solve, and gradually my ideas began to take a definite shape. I saw, at once, that the mechanism required must be in the nature of an escapement; that is to say, that there must be a constant drive and a periodical release. I must not burden the reader with mechanical details, but it is necessary that I should give an outline of the arrangement at which I arrived after much thought and a few tentative pencil drawings.

"Close to the top of the door of the case I cut two small windows, one to show the date numbers and the other the days of the week. Below these was a third window for the months, the names of which were painted in white on a band of black linen which travelled on a pair of small rollers. But these rollers were turned by hand and formed no part of the mechanism. There was no use in complicating the arrangements for the sake of a monthly change.

"And now for the mechanism itself. The names of the days were painted in white on a black drum, or roller, three inches in diameter, and the date numbers were painted on an endless black ribbon which was carried by another drum of the same thickness but narrower. This drum had at each edge seven little pins, or pegs; and the ribbon had, along each edge, a series of small eyelet holes which fitted loosely on the pins, so that, as the drum turned, it carried the ribbon along for exactly the right distance. Both drums were fixed friction-tight on a long spindle, which also carried at its middle a star wheel with seven long, slender teeth, and at its end a ratchet pulley over which ran a cord carrying the small driving weight. Thus the calendar movement had its own driving-power and made no demands on that of the clock.

"So much for the calendar itself; and now for its connection with the clock. The mechanism 'took off' from the hour-wheel which carries the hour-hand and makes a complete turn in twelve hours, and which, in this clock, had forty teeth. Below this, and gearing with it, I fixed another wheel, which had eighty teeth, and consequently turned once in twenty-four hours. I will call this 'the day-wheel.' On this wheel I fixed, friction-tight, so that it could be moved round to adjust it, what clockmakers call a 'snail'; which is a flat disc cut to a spiral shape, so that it looks like the profile of a snail's shell. Connecting the snail with the calendar was a flat, thin steel bar (I actually made it from the blade of a hack-saw) which I will call 'the pallet-bar.' It moved on a pivot near its middle and had at its top end a small pin which rested against the edge of the snail and was pressed against it by a very weak spring. At its lower end it had an oblong opening with two small ledges, or pallets, for the teeth of the star-wheel to rest on. I hope I have made this fairly clear. And now let us see how it worked.

"We will take the top end first. As the clock 'went,' it turned the snail round slowly (half as fast as the hour-hand); and as the snail turned, it gradually pushed the pin of the pallet-bar, which was resting against it, farther and farther from its centre, until the end of the spiral was reached. A little further turn and the pin dropped off the end of the spiral ('the step') down towards the centre. Then the pushing-away movement began again. Thus it will be seen that the rotation of the snail (once in twenty-four hours) caused the top end of the pallet-bar to move slowly outwards and then drop back with a jerk.

"Now let us turn to the lower end of the pallet-bar. Here, as I have said, was an oblong opening, interrupted by two little projecting

(*Continued on page* 93)

The M.P.B.A. International Regatta

Lunch-time interlude—Mr. Phillips's petrol-driven cabin cruiser "Kenvera" gives an effective passenger-towing demonstration

THE 1950 International Regatta of the M.P.B.A. was held recently at Victoria Park, London, E. Competitors from abroad were not forthcoming, but it is hoped that Swiss and French competitors will be visiting us in August to compete for the Hispano-Suiza and Ford Trophies to be held at Derby.

Due to the very hot weather, the boating lake at Victoria Park was much troubled with weed, but thanks to the efforts of many helpers the course was cleared in time.

The first race to be held was the 500 yd. event for "The Miniature Speed Championship" (Class "B" boats). The entry for this race was smaller than expected, but due to their high quality, a thrilling race resulted.

On the first "round" both F. Jutton with *Vesta II* and G. Lines with *Sparky* ended with spectacular capsizes, both at high speeds. *Vesta II* severely buckled the fuel tank (which is situated in the nose) as a result. R. Mitchell (Runcorn) made a faultless run with *Beta II* at 46 m.p.h. and N. Hodges (Orpington) also made a good run with *Sparta* at nearly 39 m.p.h.

On the second attempts, G. Lines got a fine run with *Sparky* recording 56.8 m.p.h. for the 500 yd., while B. Mitchell's *Beta II* went round in a series of spectacular hops—this being due to planing angles being altered between runs; this mode of progression was slower than on the first run and *Beta II* was switched off to avoid a capsize.

While the other competitors were having their second runs, F. Jutton had been working on *Vesta II*, and he was the last to run in this race. Excitement ran high when *Vesta II* fairly tore round the course, making a fine run at 51.5 m.p.h., just not fast enough to beat *Sparky II*!

Vesta II is one of the few representatives of flash steam about these days, but a very worthy one.

The second event was the 500 yd. race for the "Wembley Trophy" ("C" restricted boats) The first boat away in this race was that of the youngest competitor, C. Stanworth (Bournville). *Meteor* 4 put up a clean run at 38 m.p.h. and looks a dainty little boat. N. Ridley (S. London) was next with *Mairee*, a new boat this year, which has put up some very promising runs in practice; this time, however, the engine was running too rich and the speed suffered accordingly. A. W. Stone (S. London) was slower than usual with *Toots*, but faster than the preceding boats, taking 23.5 sec. for the distance (43.4 m.p.h.). G. Stone (Kingsmere) although without *Lady Babs*, ran two boats in this race, *Lady Cynthia* fitted with a 5 c.c. Dooling engine, and *Rodney*. The latter boat completed the course at just over 35 m.p.h., not up to its usual speed.

On the second attempt, C. Stanworth improved his speed to 41 m.p.h. and A. W. Stone to 44 m.p.h., while several other competitors' boats had trouble in various forms. A small "D"

class boat entered in this race by F. C. Walton (Kingsmere) ran very well, recording 33.5 m.p.h.

Thanks to the lack of delays, etc., the next item—the lunch interval—was able to be observed on this occasion and not eliminated!

On resuming the racing, the "C" class boats came on for the "Wico-Pacy Cup." This race was contested by about a dozen boats, four of

Mr. G. Stone starting up his 5-c.c. boat "Lady Cynthia"

which were "D's." As in the "C" restricted race, speeds were not as high as might have been expected, but R. Mitchell (Runcorn) with the unique twin-screw hydroplane *Gamma* went round at over 40 m.p.h. in a perfectly smooth run.

The only Class "C" flash steamer in the country, A. Martin's *Zephyr* (Southampton) made two very creditable runs at about 30 m.p.h., and B. Miles (Kingsmere) with *K24*, did close on 40 m.p.h. It was unfortunate that several of the potentially faster boats either capsized or stopped on the course. Of the former a new boat *Foz* by R. A. Phillips (S. London) lapped at over 50 m.p.h., but flipped over on both runs, and L. Pinder with *Rednip* 6 petered out after making a promising start.

Of the four "D" class boats entered only two returned a time—F. C. Walton (Kingsmere) *KM4*, and R. Curwen (Bromley) with *Elf*. *Elf* did 27.3 m.p.h., while *KM4* was faster at about 32.5 m.p.h.

The second "round" was very similar. R. Mitchell improved on his speed with *Gamma* slightly, and thus was the winner, B. Miles taking second place.

The final race was the "A" class event for the "International Trophy," and the notable event in this race was the success of the pre-war record holder *Betty*. This boat has made a fine come-back to racing this year. J. Innocent, her owner, has overhauled "the works" pretty thoroughly it seems—at all events *Betty* recorded 50 m.p.h. on the first run and this speed remained unbeaten at the finish. The nearest to this was K. Williams (Bournville) with *Faro*, 48.2 m.p.h., and E. Clark's *Gordon* 2, 46.3 m.p.h.

The holder of the trophy for 1949-50 was B. Miles (Kingsmere), but neither *Barracuda* or *Typhoon* performed up to scratch, the latter boat stalling on all attempts, and *Barracuda* blowing a plug on her first run. On the second try *Barracuda* could not get away successfully, the engine stalling on the getaways.

A good run was made by *Firefly*, H. Puntis (Southampton), but a "lone-hand" J. Grove had engine trouble with his entry.

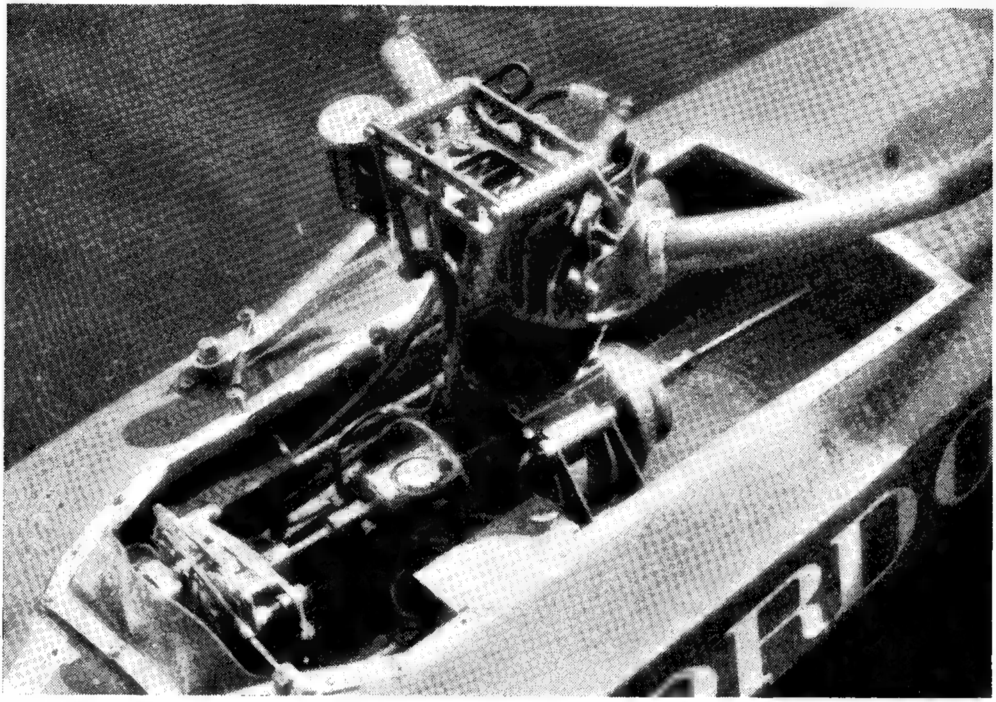
After the prize-giving, at which Mr. E. W. Vanner presided, some of the winners gave demonstration runs, and G. Lines recorded over 57 m.p.h. with *Sparky II*, but no other noteworthy runs were seen. Thus yet another regatta had to end; on the whole a very satisfying day's sport.

Results

Class "B" Miniature Speed Championship 500 yd.—1st, G. Lines (Orpington), Sparky *II*: 17.95 sec., 56.7 m.p.h. 2nd, F. Jutton (Guildford), *Vesta II*: 19.75 sec., 51.5 m.p.h. 3rd, R. Mitchell (Runcorn), *Beta II*: 22.2 sec., 46.3 m.p.h.

Two of the "little people" in class "D"; Mr. Curwen's "Elf" and Mr. Sherwood's "Jinx"

"C" Restricted. Wembley Trophy. 500 yd.—1st, A. Stone (S. London), *Toots*: 23.28 sec., 44.2 m.p.h. 2nd, C. Stanworth (Bournville), *Meteor* 4: 24.82 sec., 41 m.p.h. 3rd, G. Stone (Kingsmere), *Rodney*: 28.8 sec., 35.4 m.p.h.



A close-up of the very spectacular o.h.v. engine and magneto of Mr. E. Clark's "Gordon II"

Class "C" Wico-Pacy Cup. 500 *yd.*—1st, R. Mitchell (Runcorn), *Gamma* : 24.8 sec., 41 m.p.h. 2nd, B. Miles (Kingsmere), *KM.24* : 26.85 sec., 38.2 m.p.h. 3rd, A. Martin (Southampton), *Zephyr* : 33.55 sec., 30.5 m.p.h.

Class "A" International Trophy. 500 *yd.*—1st, J. Innocent (Victoria), *Betty* : 20.35 sec., 50.3 m.p.h. 2nd, K. Williams (Bournville), *Faro* : 21.18 sec., 48.2 m.p.h. 3rd, E. Clark (Victoria), *Gordon* 2 : 22.15 sec., 46.3 m.p.h.

Special Prize for Fastest Class "D" Boat

F. C. Walton (Kingsmere), *Jolt* : 33.5 m.p.h.

A "Novel" Calendar Movement

(*Continued from page* 90)

ledges, or pallets. Through this opening the star-wheel projected, one of its seven teeth resting (usually) on the upper pallet, and held there by the power of the little driving weight. As the snail turned and pushed the top end of the pallet-bar outwards, the lower end moved in the opposite direction, and the pallet slid along under the tooth of the wheel. When the tooth reached the end of the upper pallet, it dropped off on to the lower pallet and remained there for a few minutes. Then, when the pin dropped into the step of the snail, the lower pallet was suddenly withdrawn from under the tooth, which left the wheel free to turn until the next tooth was stopped by the upper pallet. Thus the wheel made the seventh of a revolution; but so, also, did the two drums which were on the same spindle, with the result that a new day and date number were brought to their respective windows; and the change occupied less than a second."

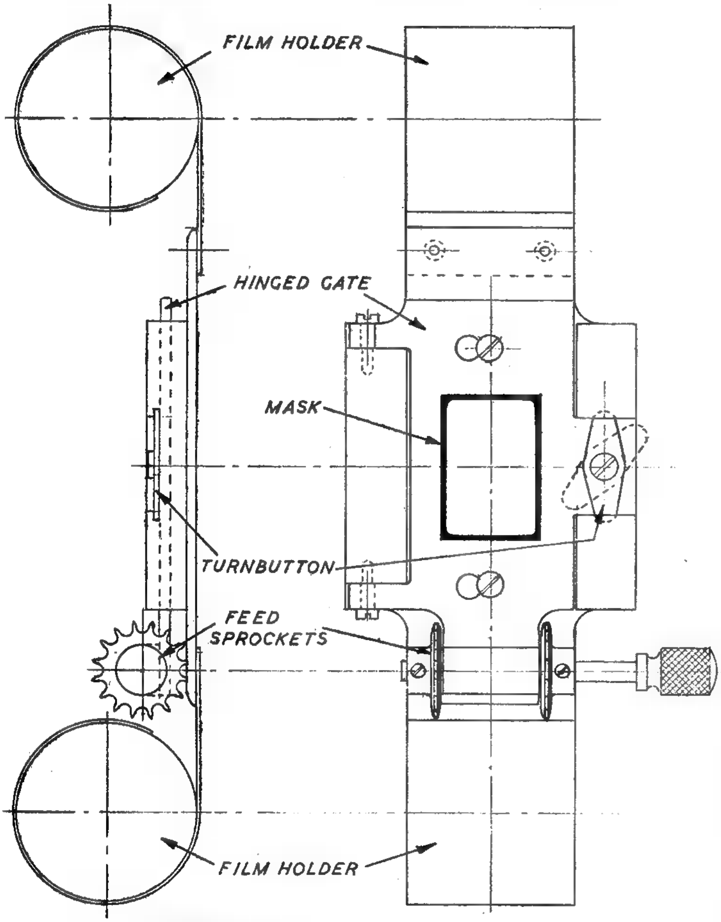
The accompanying diagram shows the writer's interpretation of the movement as described. Readers can use their ingenuity to improve or add to the design. For instance, the addition of a spring-loaded drum at the lower end of the "date" band to provide a light tension on the band might possibly be an improvement. The fact that the date band completes one cycle per month (allowing for the inevitable resetting by hand) lends itself as a possible means of operating the "month" band mentioned in text, yet the extra complication may not be justified, for the date-band must be re-set by hand at least eight times per year. The movement must also be rewound, probably a monthly practice, and the "month" band can be easily changed by hand on these occasions.

It is a "novel" movement in more senses than one, and it is hoped that some reader of "ours" who possesses a long-case clock, will be tempted to make and fit this device.

*Miniature Slide and Strip Projectors

by "Kinemette"

THE design of a suitable filmstrip carrier for an adaptable projector of this type presented several problems. In the first place, it had to be instantly interchangeable with the slide carrier, and it was very desirable that it should be possible to do this in the course of a lecture or demonstration, therefore it should not entail the use of tools, or call for delicate manipulation. It was also necessary to arrange for the use of either single- or double-frame filmstrips, with appropriate masking arrangements to produce a clear-cut edge to the picture in each case. Further, a heavy, complex or cumbersome fitting would be out of keeping with the general design of the projector; and the constructional processes involved must be adapted to the facilities of the average constructor.



General arrangement of filmstrip carrier for single or double-frame filmstrips (half size)

It may here be mentioned that in the design of a projector intended for commercial production, the constructional problems could, and probably would, have been dealt with by the use of presswork or die-castings; but neither of these methods is practicable here, and fabrication of the components from stock material, as in the case of the slide carrier was decided upon. A good deal of experimental work was entailed in getting this individual item of equipment right; the early attempts, though reasonably satisfactory in performing their alloted function, did not satisfy all the above conditions, particularly in respect of simple construction.

General Design of Carrier

It will be seen that the main body of the carrier consists of a hinged frame, similar to the film holder employed in many types of enlargers, and adapted to slip into the stage of the projector in place of the slide carrier; the provision for the rotation of the stage enables the aperture of the frame to be disposed either horizontally or vertically as required. Holders for the filmstrip are attached on either end of the frame in such a way that they do not interfere with its insertion in the stage, or its rotation; these are of the simplest possible nature to avoid either complex or cumbersome appendages. The film is fed through the aperture by a pair of sprockets which engage the perforations in the borders of the film, and are operated by a knurled knob.

As in the single-frame strip projector, the film moves between lightly spring-loaded plates, having the centre portion relieved to avoid

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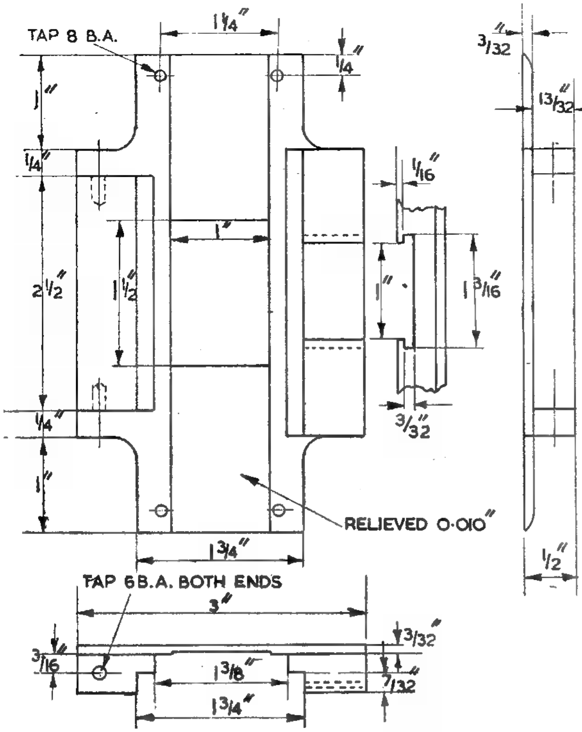
*Continued from page 22, "M.E.," July 6, 1950.



Details of frame backplate

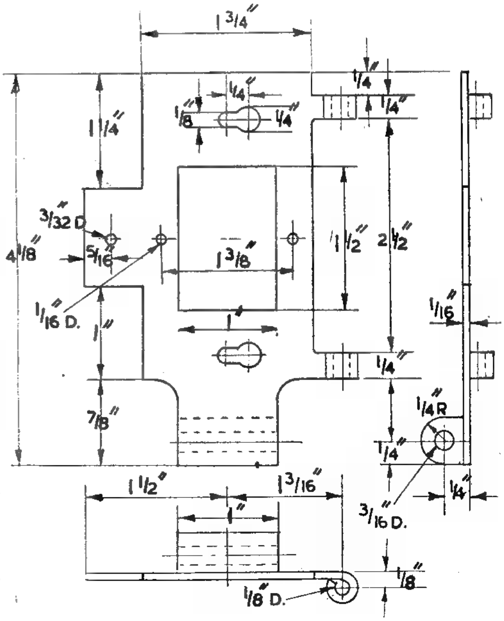
abrasion of the film, and the aperture in one of these plates forms the mask to frame the picture. In view of the fact that two sizes of frame have to be provided for, however, this condition has been met by the use of interchangeable pressure plates, which can be changed instantly and easily. It may be mentioned here that in addition to the single-frame (18 × 24 mm.) and double-frame (36 × 24 mm.) standard filmstrips, a third size of frame is occasionally encountered, namely, 24 × 24 mm., to conform to the negative size of certain types of 35 mm. cameras, such as the Robot. This, of course, can be provided for simply by adding another pressure plate with a mask of appropriate size.

The materials recommended for constructing the carrier are much the same as for the slide carrier, but it may be mentioned that aluminium alloys of any kind, which cannot readily be fabricated by soldering, may be considered by some constructors to be less suited to simple construction than brass. If, however, one decides to use solder for joining the parts, a better material than brass, from the point of appearance and strength, is nickel silver. It should be clearly understood that soldering is by no means a necessity in building up the components, though it may simplify the work of doing so; if it is used, it should be sweated into the joints (not plastered on the outside), and carefully cleaned off all external surfaces.

Frame Backplate

The plate which forms the actual frame is shown as 3/32 in. thick, and if material which is quite true and well finished is available, it may be used without any machining of the surface beyond the relieving of the film track. But in many cases it may be found desirable to use $\frac{1}{8}$-in. material and skim the front face before assembly, and after attaching the guide strips, machine both their edges and the back face of the frame to the correct thickness to slip into the stage of the projector. For the first operation, the methods which have been described for dealing with the stage fittings of the projector may be employed; namely, by clamping the plate to the vertical face of an angle-plate mounted on the cross-slide, and using a fly-cutter running in the lathe chuck. It will, of course, be necessary to use a plate having a margin of width sufficient to enable it to be clamped to the angle-plate at the edges, and the relieving can be carried out at the same setting, the unwanted margins being cut away afterwards.

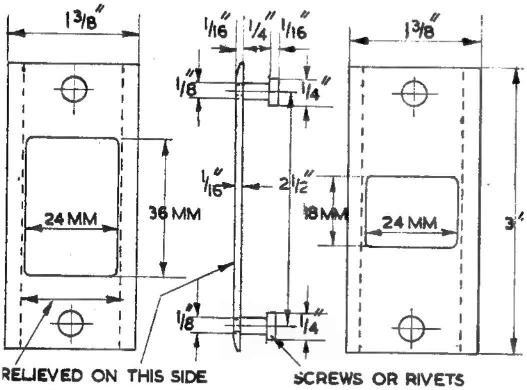
To make the guide strips, material $\frac{7}{16}$ in. thick is advised, and one face should first be trued up by machining or filing and scraping, so that it beds down perfectly truly on the frame plate. The rebate on the front edge of each strip should preferably be milled, if the means of doing so



Hinged gate

are available, but it should be noted that this is merely ■ clearance, and does not call for any special accuracy; the actual edges of the strips, however, form the guide to control side play of the film, and must be accurately located with reference to the relieved channel of the frame. It would be quite practicable to cut the rebate after the strips are attached, by setting up the assembly on the angle-plate and using the fly-cutter ■ before.

No particulars are given on the detail drawings of the means of securing the strips to the frame, ■ this can be left to the discretion of the constructor; either rivets or screws may be used, but in neither case are projections from either side of the frame permissible when the assembly is finished. Rivets 3/32 in. diameter, or 6-B.A. screws, are suitable, not less than four in each strip. The undercut groove in the right-hand side strip may be milled or filed, according to available facilities; ■ an alternative to cutting



Interchangeable masks

it straight across, the strip may be set up in the four-jaw chuck and a circular recess 1 in. diameter by 5/32 in. deep turned in it, then undercut to $1\frac{3}{16}$ in. diameter with a suitable boring tool. Afterwards the sides of the groove may be filed square across to 1 in. width, but it is not necessary to touch the undercut at all.

When the strips are assembled, the outside edges of the frame may be filed to shape, and the ends of the film track carefully rounded off. The aperture in the frame, being slightly oversize, does not act as a mask, and so long as it is reasonably square and well finished does not call for special attention.

Gate

This is cut from $\frac{1}{16}$-in. (or 16-gauge) plate, and it will be seen that the hinge lugs have to be bent to shape; ■ length of approximately $\frac{3}{8}$ in. beyond the centre line of the hinge should be allowed for this. If duralumin or other high-tensile light alloy is used, it will need to be locally annealed, and for this operation, the surface should be smeared with soap, and heated until this turns black before quenching in water. For the bending operation, hold the plate in the vice, with copper clamps or smooth jaw inserts to avoid marking it, and place ■ $\frac{1}{8}$-in. straight silver steel rod against the lugs, adjusting the height so that the centre line of the hinge coincides with that of the rod.

Now place ■ fairly heavy "holder-upper," such as the end of ■ rectangular bar, against the rod, pressing slightly downwards to keep it firmly in contact with the plate, and bend each lug in turn carefully over with a few blows of a mallet. When the turn approaches a right angle, the rod will no longer have to be held in place; and when bent as far as it will go at this setting, the plate can be removed from the vice, and the bends completed by resting the lugs on the vice top or ■ steel block, and hammering the ends around the rod. The operation is one that is easier to carry out than describe, and should present no difficulty if the right methods are used.

If, however, bending is objected to, the eyes of the hinge may be made separately, drilled for the hinge pins and riveted to the plate; in the case of brass or German silver, short pieces of round material with ■ flat on one side may be silver-soldered in place. It would even be possible to adapt the design to take small ready-made hinges, but these would be somewhat flimsy and not so neat. The only other attachment to the flat plate is the block which forms the bearing for the sprocket shaft, and this is best made by machining from the solid, and attached by means of two countersunk 8-B.A. screws from the back of the plate. These will probably project slightly inside the bearing hole, and will need to be filed down, and a drill or reamer passed through the hole afterwards.

Interchangeable Masks

These also may be made of $\frac{1}{16}$-in. material, which is the thinnest that can be recommended, in view of the need to relieve the centre of the pressure face, preferably by face milling as previously described. The apertures in each mask must be very carefully milled or filed to correct shape and dimensions, and preferably tapered outwards all ways from the pressure face. Either screws or rivets may be used for the locating pins, which are ■ permanent fixture, and the ends must not project beyond the relieved back face; the thickness of the heads also should not be greater than that shown, or they may project beyond the width of the gap in the projector stage.

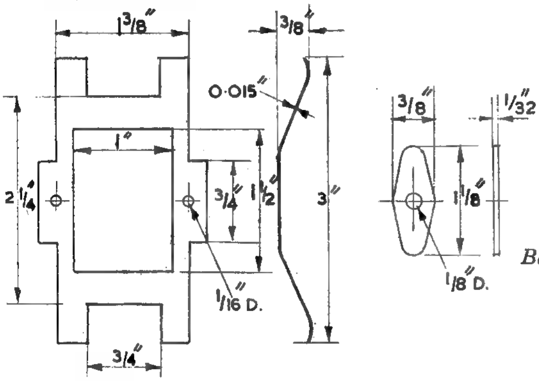
The distance apart of these pins should, of course, coincide with that of the keyhole slots in the gate frame, so that the heads will pass through the enlarged ends of the latter, and lock in place when the mask is moved sideways into the normal location, central with the film track.

Spring Plate

The best material for this is spring steel, but either hard brass or rolled steel, as used for shim stock, has been found quite satisfactory and much easier to work, though it must be made a little thicker than spring steel for the same strength. After cutting to the shape shown, it is bent to approximately the amount of "set" indicated in the edge view, and riveted to the inside of the gate, allowing the minimum projection of the rivets on the inside.

Sprockets

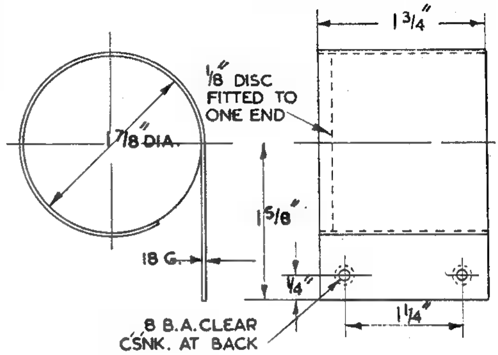
Some constructors may approach the task of making these with trepidation, but they are not at all difficult to make if some means are available for indexing the lathe mandrel, and drilling the tooth spaces with a simple milling spindle on the cross slide. They may be made from brass or duralumin, and the blanks should be left well oversize on the outer diameter, so that when the holes are drilled they cut into solid metal, and do not break out at the edges. It is also desirable to leave the sides of the sprockets parallel at this stage; a good method of procedure is to make the pair "back-to-back" from bar material, the two bosses being turned down, and the centre bore drilled, but the actual sprockets left in one piece till after they are drilled to form the teeth, after which they are separated with a parting tool. All these operations may be carried out while the components are integral with the bar stock which forms the chucking piece; after parting off, final operations, which are very light, are carried out by mounting the sprockets individually on a pin mandrel.



An 80-tooth change wheel may be used for indexing the blanks in 16 positions. A small centre-drill, or a short, stiff spearpoint drill, should be inserted in the chuck of the drilling spindle and run at high speed to start the holes, then followed up by going round again with a $\frac{1}{8}$-in. drill, which should go in deep enough to form the teeth of both sprockets at once. Then part the sprockets off, and mount them on the pin mandrel to clean up the faces, bevel or round off the sides of the teeth and turn the outside to finished diameter.

The outer flanks of the teeth may be milled if suitable gear is available, or they may be filed by hand, as high precision is not necessary in this particular application. A very simple filing jig may be made for this purpose by drilling two holes 15/32 in. apart in a short strip of steel about $\frac{1}{8}$-in. thick, fitting one with a short $\frac{3}{16}$-in. peg to locate in the bore of the wheel, and tapping the other for a 8-B.A. screw. A steel "button" 7/32 in. diameter, with a $\frac{1}{8}$-in. spigot to locate in the holes which form the base of the teeth, is then attached to the strip, and may be clamped in place by the jaws of the vice, or by screwing the end of the peg to take a locking nut. The outer diameter of the button with them form a guide for shaping the teeth, and if it is hardened, will retain its accuracy long enough to file up several sprockets. Finally, the teeth should be polished with fine emery cloth and all burrs very carefully removed.

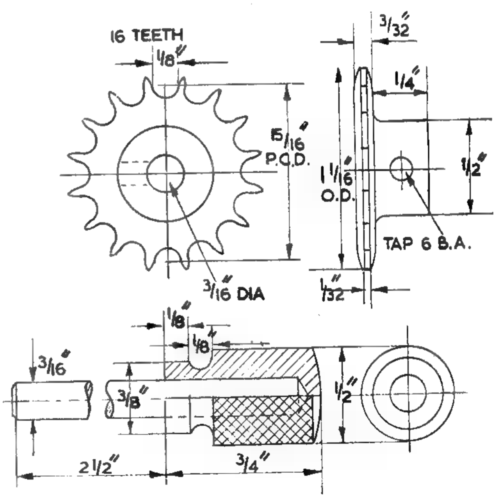
The sprocket shaft is made from $\frac{3}{16}$-in. mild or silver steel rod, and may be permanently fixed to the knurled knob by making it a press fit or screwing in on a tight thread. If the knob is drilled with a No. 15 drill and a $\frac{3}{16}$-in. reamer



Above—Film holders

Left—Spring plate

Below—Details of sprockets, operating knob and shaft (full size)



inserted as far as it will go in the blind hole, a piece of standard $\frac{3}{16}$-in. rod, slightly tapered on the end with a Swiss file, will press home quite securely. If desired, flats or "dimples" may be provided on the shaft to locate the grub screws which hold the sprockets, but this has not been found necessary. It will be noted that

the shaft is made long enough to carry the knob out from the carrier, in a convenient position for operating when in the projector.

Film Holders

As already mentioned, these are of the simplest possible construction but may be elaborated if desired. The size is suitable for the normal length of film strip, that is, about forty single frames, but it may be enlarged to suit longer strips. If the films are normally stored in fairly compact rolls, it will be found that they feed into the take-up holder quite naturally, but open-wound films may tend to jam; this condition, however, is easily dealt with by inserting two fingers into the holder to give the film a twist; it is not encountered as a rule.

The wrapper of the holder is bent from 18 gauge material, and if brass or German silver is used, the disc may be sweated in; for light alloy, three 10-B.A. countersunk screws may be tapped into the edge of the disc. Note that the holders are "handed," the top one having the disc fitted at the right as shown, and the bottom one at the left. The construction may be stiffened up if desired, but it is hardly necessary, as the duty is extremely light, and there is no reason why any heavy strain should ever be imposed on the holders under normal working conditions.

Assembly

Before attaching the spring plate to the gate, the latter should be laid in its closed position on the backplate, to check the exact position for the holes to take the hinge pins. The gate should lie parallel with the backplate, and not less than 3/32 in. below the surface of the side strips; a parallel packing piece $\frac{1}{4}$ in. thick may be inserted in the track groove and the plates clamped together to locate the gate hinge for marking out or spotting the holes.

The two six B.A. screws which form the hinge pins have a plain shank $\frac{1}{8}$ in. diameter and will, of course, have to be made specially; this also applies to the screws or rivets in the masks, and the pivot for the turnbutton which secures the gate in the closed position. It has not, however, been considered necessary to give detail drawings of these small items, as their shape and dimensions will be obvious.

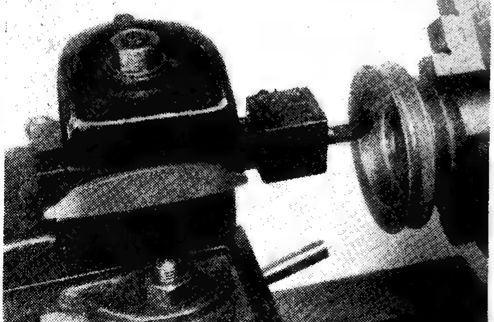
Finally, the sprocket shaft is assembled, the two sprockets being located so that their teeth line up, and locked on the shaft with grub screws. The film holders are attached to the ends of the backplate by 8-B.A. countersunk screws, which must not project beyond the track surface; they may, however, be filed flush after insertion.

(To be continued)

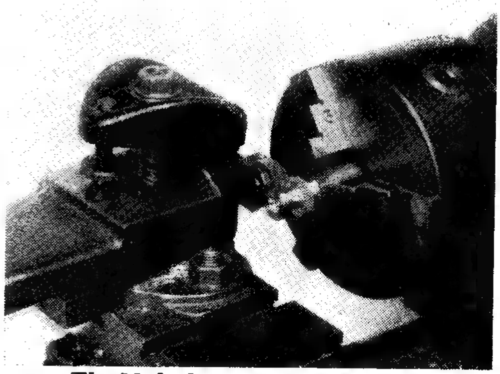
New Myford Lathe Tools

Two items recently introduced as additions to the Myford range of accessories are a two-way tool bit holder and a knurling tool, both intended primarily for use in conjunction with the Myford patented height-adjusting packing block, though they could be used with ordinary packing. The first-mentioned consists of a $\frac{1}{2}$-in. shank having an enlarged head, with two parallel sockets to take $\frac{1}{4}$ in. round and $\frac{1}{4}$ in. square section tool bits, each being held in place by two socket-head grub screws. As shown in the photograph, the round socket is specially useful for holding small boring, internal threading and recessing tools, while the square socket is more suited to external tools, though they will serve either purpose.

The knurling tool also has a $\frac{1}{2}$-in. shank, the head being made deeper to take a substantial pivot for the knurling-wheel. In the operation shown, a fairly coarse knurl is used, but other wheels are available. This type of holder is not recommended for "diamond" or cross knurling, which is best carried out by two oblique cut wheels operating simultaneously in an adjustable double holder. The tools illustrated are available from all Myford stockists or from the Myford Engineering Co. Ltd., Beeston, Notts.

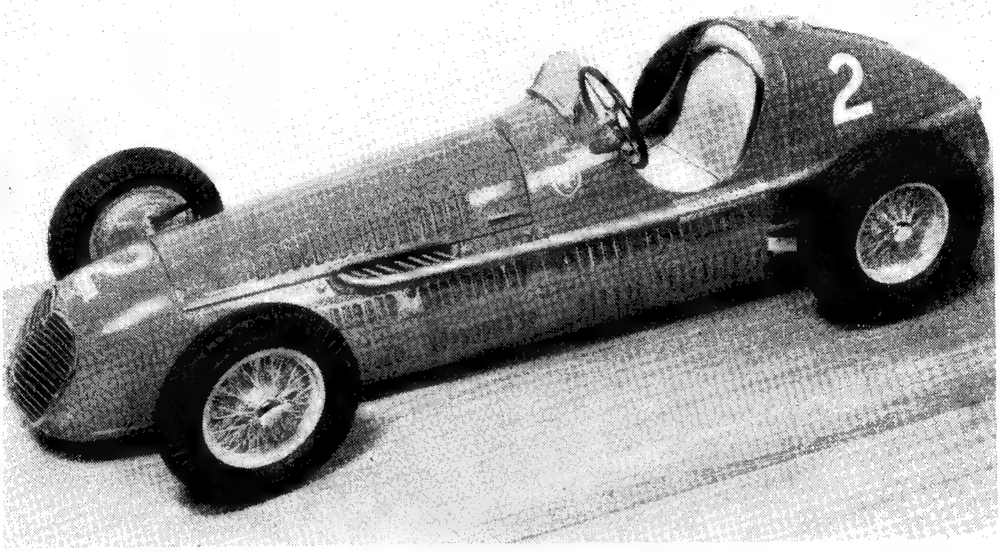


The Myford two-way tool bit holder, with round section boring tool in use



The Myford knurling tool in action

MODEL CAR SUPPLEMENT



The $\frac{1}{10}$th Scale 4CLT/48 Maserati

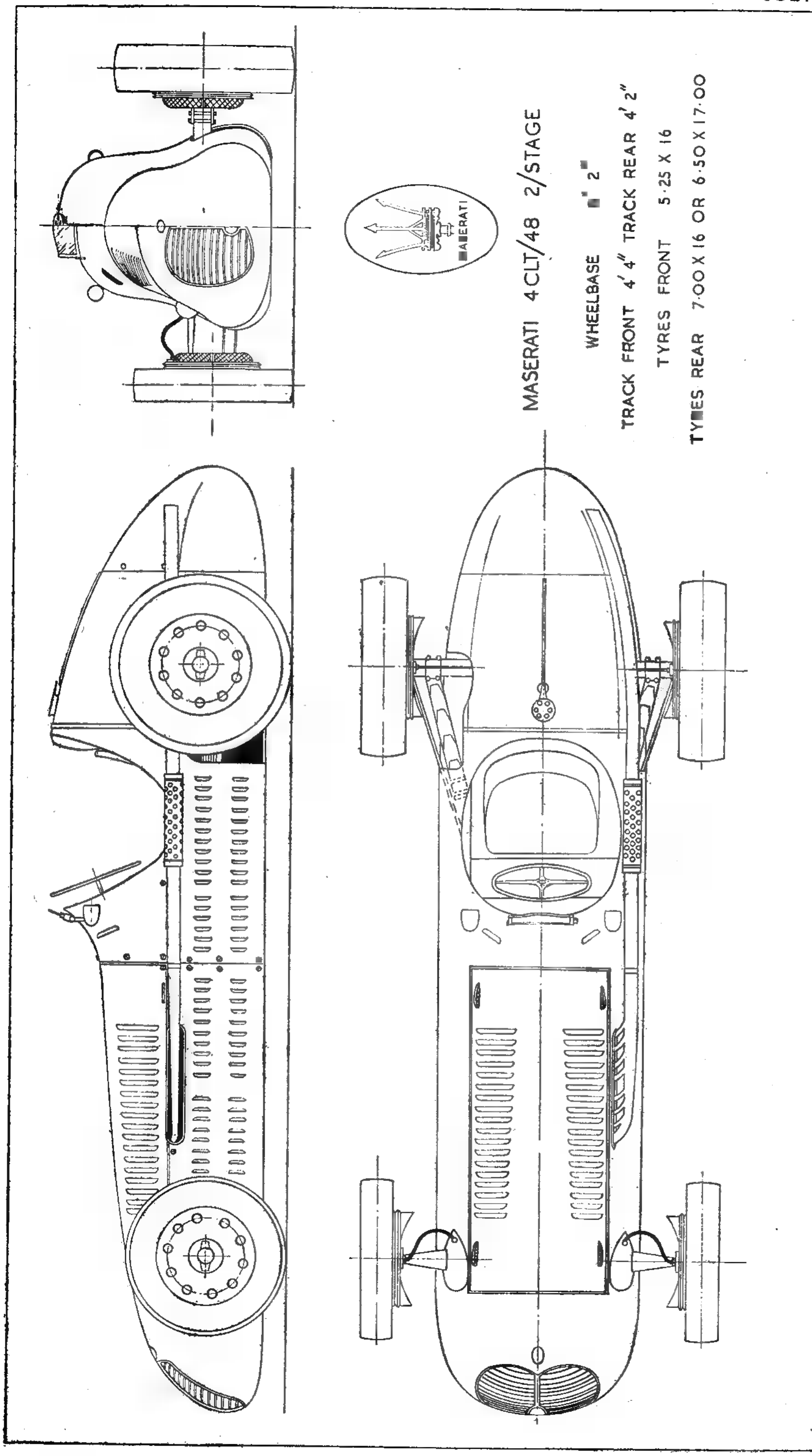
by Rex Hays

IT was in 1926 that Alfieri Maserati constructed the first Maserati racing car. Previously, he had been responsible for the 1922 Grand Prix Diatto cars. He first made his name as a racing mechanic and later as a driver. He died as a result of an operation in 1932, but the business of building racing cars was carried on by his four brothers—Bindo, Ettore, Ernesto and Prof. Mario, and today Maserati is one of the great names in Grand Prix racing, the type 4CLT/48 being probably one of the most successful cars ever turned out by these famous brothers. The motoring Press seem to regard the 2/stage Ferrari as the car of the year 1949. I disagree with this most strongly—the 4CLT/48 Maserati had many more Grand Prix victories to its credit, and I would be inclined to say that, with the exception of the type 158 Alfa Romeo, this 2/stage Maserati has been the most consistently successful Grand Prix racing car of the post-war era. It was therefore with real pleasure that I set to work to build a non-working glass-case replica of this grand car. The model was to be 1/10th scale and highly detailed; further, it was to be of Baron de Graffenreid's 1949 British Grand Prix winner.

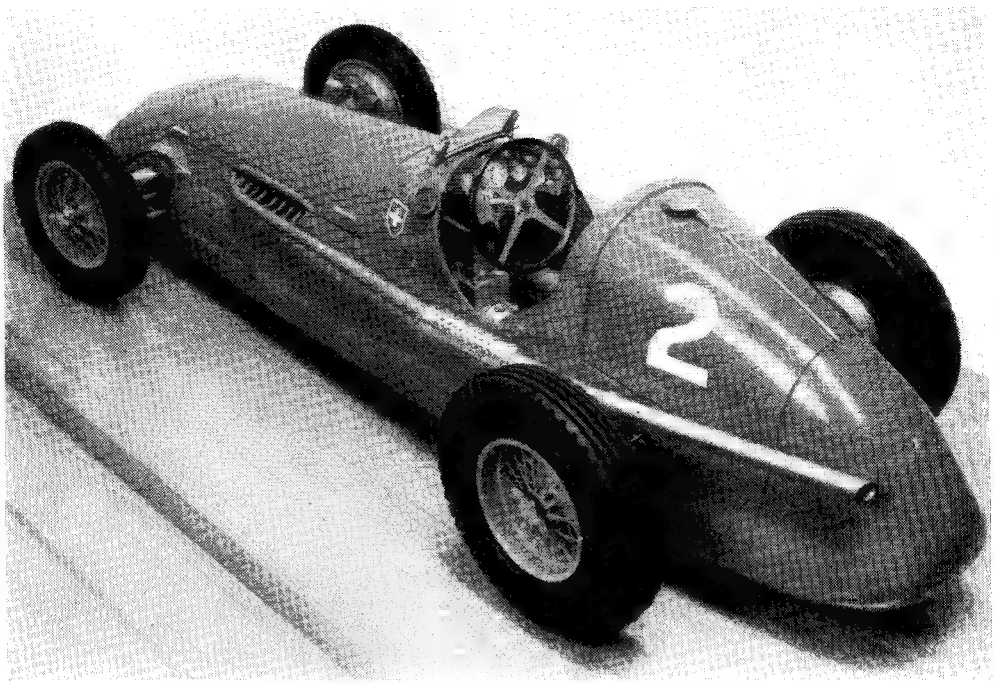
Now this was a very happy state of things, as at Silverstone last year I had had a long chat with De Graffenreid, and he and I had measured up his car, just in case a model was wanted at a later date.

Regarding the actual designing and building of this Maserati, I feel that if one is not careful, one runs the risk of repeating much of what I have already said in my article on the B.R.M., namely, that for the highest possible degree of accuracy in body contour and outline, it is desirable to check known dimensions against calculated dimensions, and to check those results against a further known dimension and so on. Well, this principle was adhered to, and from the drawing board I learned the various key bulkhead outlines which, when finally formed, constituted the structure to which the bodywork would be attached.

As to the detailed construction, I would first like to emphasise one important and interesting point—it is that although this model was built for exhibition purposes and is destined to be static and firmly imprisoned in a glass case for the duration of its existence, it is not strictly speaking a "solid." It is, in fact, quite hollow and in design is a very close relative to the powered chaps, and could very easily be adapted for power.


MASERATI 4CLT/48 2/STAGE
WHEELBASE ' 2"
TRACK FRONT 4' 4" TRACK REAR 4' 2"
TYRES FRONT 5·25 X 16
TYRES REAR 7·00 X 16 OR 6·50 X 17·00
MASERATI

The front and rear suspension actually work, mainly because it was necessary to make them work to achieve the correct mechanical detail, and I may say that great fun was had "playing one would be making a mistake. Its comparative simplicity of outline is inclined to be very deceptive, the bodywork being full of subtle curves, any of which, if missed, tend to destroy



with it" in the latter stages of the final assembly. The front wheels steer, but for reasons of economy of time, and because it was quite unnecessary, the steering is not linked to the steering wheel.

Further, it may be interesting to note that some degree of proof of these facts may be apparent when one considers that the front suspension, described in G. W. Arthur-Brand's most excellent and interesting series of articles on his Grand Prix M.C.N. 10 c.c. powered model, is very similar to the 2/stage Maserati, and I think we must thank him for demonstrating that a scale model suspension can be both authentic and operable.

I thought, therefore, that for the purpose of this article, and for the benefit of those who may be interested in building a model of this Maserati, it would be more interesting to say rather less in actual words, and rather more by illustration of the various essential component parts, including the cockpit, in detail.

The lines of the car can be seen in the general arrangement drawings, and it will be appreciated how easy it would be to caricature it—in fact, the tail is almost a caricature in itself, being shortish and very blunt at its extremity. One is inclined to approach the building of this model by saying to oneself, "This is an easy one, is it not?" after the style of Jimmy Edwards, but I think the character of the car. Here to start with are some key dimensions :—

Wheelbase	8 ft. 2 in.
Track front	4 ft 4 in.
,, rear	4 ft. 2 in.
Tyres front	5.25 × 16
,, rear	7.00 × 16 or 6.50 × 17

Colours :

Bodywork	Bright scarlet.
Upholstery	Sky blue.
Wheels	Golden yellow in the case of De Graffenreid's car ; otherwise, silver.

This car also bears its driver's monogram on the scuttle, which is a white cross on a red shield framed in white.

With regard to the front suspension, the two sketches show all that is necessary here. It will be seen that, true to the disconcerting habits of Grand Prix car designers, there are two distinct types of steering mechanism—the more usual form (i.e. the steering arms located just above the wishbones, and disappearing straight into the bodywork, as in Fig. 1) is seen on De Graffenreid's car, and the type in Fig. 2, with the track rod in front of the suspension after the style of the Ferrari, is fitted to Bira's car.

The brake drums were turned in brass, hollowed from the back and drilled in exactly the same manner as I described in the building of the B.R.M. The separate brass brake-plate takes the fore and aft air scoops and the suspension. The units making up the front suspension can be seen in an exploded drawing, Fig. 3, and were all formed in brass and bolted into position.

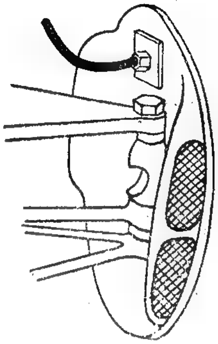


Fig. 1

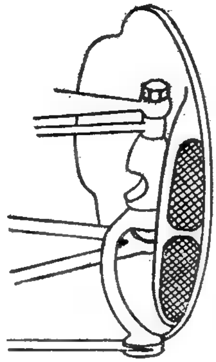


Fig. 2

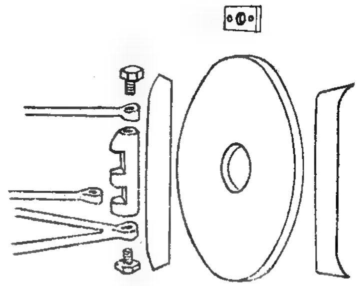


Fig. 3

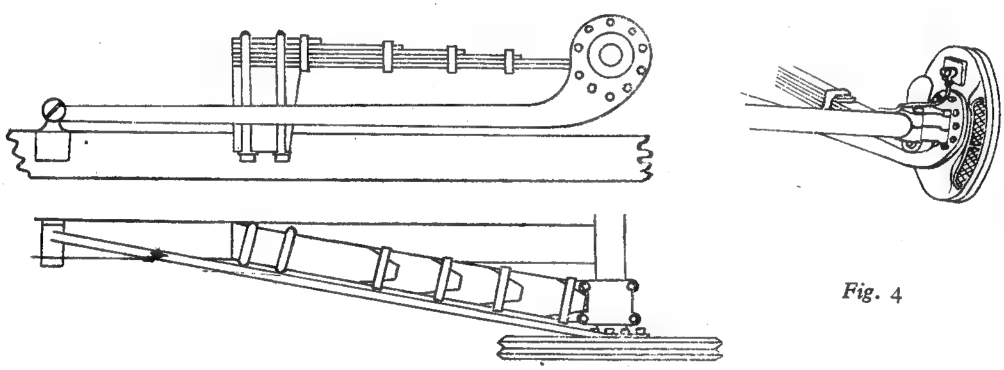


Fig. 4

The rear suspension, also illustrated, is ¼ elliptic leaf springs mounted at an angle which causes them to disappear into the body, where they bolt on to a bracket which stands well above the tubular frame: the radius arms bolt to the centre of the brake-plate, and enter the body below the springs; in fact, on the same level as the top of the frame to which they are secured by a bracket about 12 in. farther forward than the spring mountings (Fig. 4). It will be realised that the positioning of the tubular frame inside the cockpit is critical in relation to the rear suspension, as the tail-end ground clearance and set of the car will obviously be determined by this factor. The ¼ elliptic leaf springs were made in brass, the leaves held together by clips as, in fact, the full scale spring leaves are secured. The mounting of the springs to the frame-bracket was by U-bolts which locate in the top plate of the securing bracket. Looking down on the car, these fixings are about level with and on either side of the driver's seat.

At the axle end, the rear springs are anchored below the rear axle casing in the following manner. I took two small pieces of square section brass, drilled them through the middle so that they would fit the axle casing (Fig. 4A). The mounting was then filed to shape, and again drilled at the four points at which the securing bolts (dummy) were to be fitted (Fig. 5). These mountings were then soldered to the springs, great care being taken with the angle at which

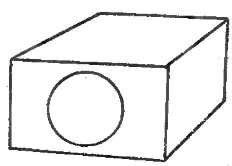


Fig. 4A

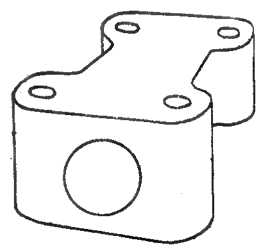


Fig. 5

they were fixed, as, of course, the springs must not only locate the correct distance above the frame, but also at the correct angle.

(*To be continued*)

A Free-Lance 5 c.c. Racing Car

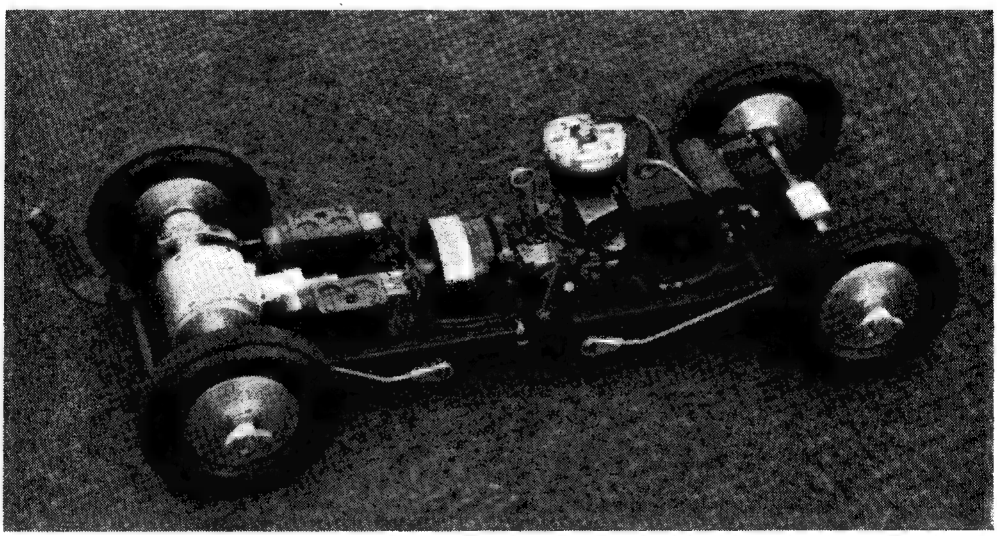
by V. G. Middleton

THIS is the fourth car that I have designed and built, and it was intended to be as simply constructed and trouble free ■ possible, lending itself to quick pit adjustment with the minimum number of tools. As such, it has paid ample dividends.

The car is powered by a 5-c.c. Phantom P.30 aero engine with a few alterations to adapt it for use on the track. The first, the trouble spot of nearly all two-stroke engines, the contact-breaker, was made from a phosphor-bronze spring stamping with a lug bent over to operate from the cam on the crankshaft. This was replaced by a steel arm and operated by a hardened push-rod similar to Mr. Westbury's design ■ used on his Cadet and Ensign engines. The cylinder-head was turned from dural bar and let in to increase compression, and has a copper gasket of 0.005 sheet to make a good seal. The engine has twin transfer ports and ■ flat-top piston, and has never been completely dismantled since it came into my possession nearly four years ago. The flywheel is the original one fitted, drilled and tapped to take the crankshaft extension and pivots for the clutch shoes.

The clutch is of two-shoe type and made from ■ $\frac{3}{16}$ in. section mild-steel ring faced with Capasco, which was given to me by Mr. Jones, who originally introduced it to model cars for this purpose. They show no signs of wear after 3 years' hard running. The clutch drum runs on ■ bronze bush and is retained in position by ■ large headed screw located in the end of the crankshaft extension. This makes the power unit complete. A ball-headed and cross-pinned carden shaft fits into the drum sockets, to transmit the drive.

The gearbox is rather large, but was made this way to facilitate the fitting of different sizes of bevel gears, the present ones being Z.N. $1\frac{3}{4} : 1$ ratio. This unit consists of four separate parts and has five $\frac{1}{4}$ in. $\times$ $\frac{3}{4}$ in. ball-races which were



worth the trouble and care in fitting, as the car will run some four or five laps after the juice has been "knocked off."

Not liking to fit the weighty 2.4 Nife cell or $4\frac{1}{2}$ V flat batteries in their usually unsightly position, I obtained ■ pair of single Nife cells and arranged them as shown in the photograph.

Having collected all the material together, a start was made on the chassis. All the known methods of construction I automatically rejected, as I wanted to be original, and after burning the midnight oil I decided on ■ tubular frame-work; but I did not want to have tie-bolts, etc., and a straight butted-tube cross-piece did not seem to have the strength. Here my good friend Mr. Zere came to the rescue and suggested that spiral spiggots pushed in the ends of the cross members and located in drilled holes in the main tubes would do the trick. They did.

Having made up the switch, radius-arm brackets, engine brackets, the Nife battery supports and ■ small bent-up channel-sectioned cross-piece for strength from 18-s.w.g. mild-steel, the front gearbox axle supports were made from $\frac{1}{8}$-in. mild-steel strip. All were fitted in position and held by 8-B.A. steel screws and the whole lot was "Easy Flo" silver-soldered. The

(*Continued on page* 106)

Here —— and —— There

by "Clubhound"

A FINE day's racing, with brilliant weather, was enjoyed by all who visited Derby on Sunday, June 25th, for the Percival Marshall Memorial Trophy, which was run in conjunction with Derby's Open event.

The "P.M.M." pot was taken by F. G. Buck (Meteor), Harry Howlet (also of Meteor) being a very close runner-up. They were, as a matter of interest, equal on points until Gerry finally pulled away on performance.

For the "P.M.M." Trophy, the rules were amended by the M.C.A. to enable 2.5 and 5 c.c. cars to compete on an equal footing with the 10 c.c. class by an amendment in the system of performance marking, viz :—

10 c.c.

To obtain maximum marks, 15, it was necessary for the car to put up an average of 95 m.p.h. or over.

Ken Smith, of the Dundee Model Car Club, pushing off

To obtain 10 marks, an average of 85 m.p.h. or over.

To obtain 5 marks, it was necessary to complete the run, at any speed.

5 c.c.

Working as above :

For 15 marks, 72 m.p.h. ; 10 marks, 60 m.p.h.; 5 marks, complete run at any speed.

2.5 c.c.

For 15 marks, 60 m.p.h. ; 10 marks, 50 m.p.h.; 5 marks, complete run at any speed.

In the Open event the "Rolls Royce" Trophy for 10 c.c. cars went to C. M. Catchpole (Surrey) with an average of 115.53 m.p.h. Second was J. Petrie (Sunderland) with 112.21 m.p.h., and third, K. Shaw (Ossett) 110.02 m.p.h. All prizes in this event were presented by Messrs. Rolls Royce.

The 10 c.c. British event brought Gerry Buck back into the picture with *Topsy* to win at 109.75 m.p.h., J. Riding of Bolton followed for second place with 89.81 m.p.h., A. Nash of Derby taking third place at 87.46 m.p.h.

The "Frank Walker" Cup, 5 c.c. open, was won by Mrs. I. W. Moore, of Derby, at the formidable speed of 87.63 m.p.h., C. M. Catchpole being a close second, 86,45 and A. Armstrong (Sunderland) third, 81.15 m.p.h.

Alec. F. Snelling (Edmonton), came through with 66.96 m.p.h. to win the "Chaddesden Shield," J. A. Oliver (Nottingham) being second with 66.51, and J. S. Oliver (also Nottingham) third, 63.73 m.p.h.

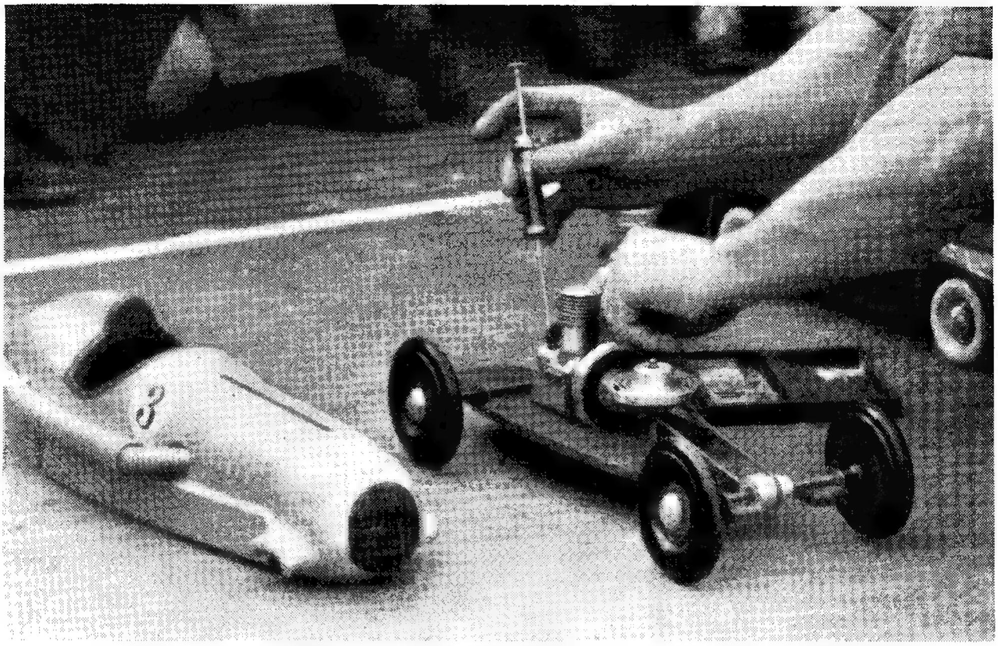
The *Concours d'Elegance* was awarded to the very fine Austin A.90 Atlantic of A. Armstrong (Sunderland).

Before a record crowd of 2,000 spectators, F. G. Buck romped away from other competitors to become first holder of the Scottish Individual Miniature Race Car Speed Championship at Riverside Park, Dundee, on June 18th.

Winning the silver rose bowl, presented by Mr. E. Doel of Dundee, with an average speed of 106.63 m.p.h., put up by his 10 c.c. McCoy engined car, F.G.B. then proceeded to collect the "runner-up" title by averaging 104 m.p.h. with his well-known home-made car *Topsy*, thus leaving no doubt as to his entitlement to the trophy ! Well done, F.G.B. !

C. M. Catchpole (Surrey), had bad luck when the piston of his Dooling, which has previously run at 118 m.p.h. clouted the plug electrode, thus closing the points. The result was that his average for two runs was reduced to 86 m.p.h. After the official runs the trouble was remedied and the car promptly turned in 107.9 m.p.h.

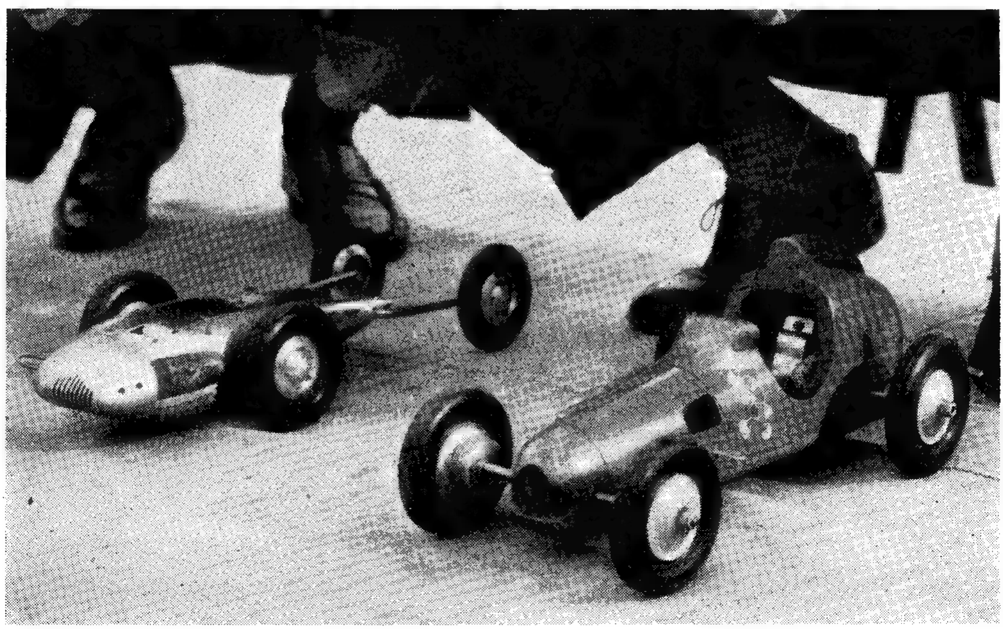
To turn to brighter news from Surrey, Mr. Catchpole informs me that at long last the S.M.R.C.C. have been able to locate a suitable site for their new track, near Weybridge. Those enthusiasts who attended meetings at the old venue at Christmas Pie will recall the hospitality of the Surrey Club, and the very many happy



Why not some cheap, easy-to-build cars which could be raced in a straight line? This picture, from Germany, shows how easily it can be done

meetings which took place there. We wish them continued success and good motoring when this new circuit opens.

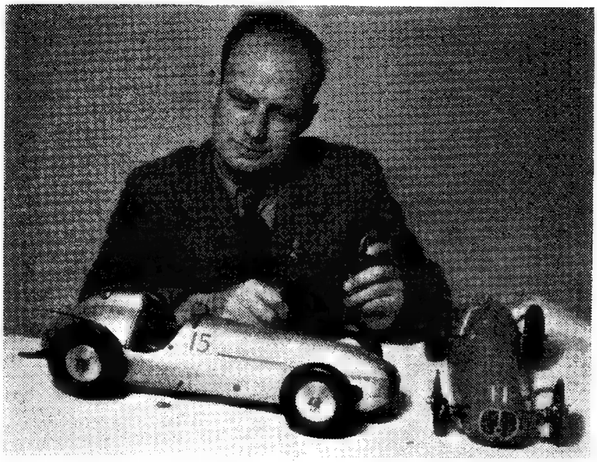
The Austin Trophy has been collected this year by Gerry Buck with his McCoy powered car at a speed of 115.14 m.p.h., C. M. Catchpole and W. Warne tied for second place (Doolings) at 112.5 m.p.h. E. V. Snelling put up a British



Two of the entries for the "Coupe de la Municipalite" held in Paris recently. Note the trend!

5 c.c. record with his home-made car at 84 m.p.h., and W. Moore ■ British Open record with his Dooling powered car at 85 m.p.h.

The Mayor of Gosport, Councillor C. B. Osborn, recently opened the new track in Gosport Park, commenting that he was "pleased that Gosport had something that Portsmouth had not!" Built by volunteer members of the Gosport Model Engineering Society, the track will, however, be used also by the Portsmouth Model Car Club, who have been enrolled as associate members. Top speed on the opening day was put up by Mr. G. S. Williamson (society secretary) with the ex-Peter Hugo 10 mile record holder, at 77 m.p.h.



A. F. Snelling, one of Britain's keenest model engineers, pictured here in Sweden last year with two of his home-built cars, powered by home-designed and built engines!

Perhaps this is as good ■ place as any to note that club secretaries are not sending in their reports as early as they might for early publication in THE MODEL ENGINEER. Please remember that the editor is anxious to co-operate with the clubs, but this co-operation must at least be reciprocated!

A Free-Lance 5 c.c. Racing Car

(*Continued from page* 103)

heads of the screws were cleaned off and the chassis sandblasted and stoved with two coats of black enamel. I was more than pleased. I took the finished job to a P.M.R.C.C. meeting and invited all and sundry to try to twist it out of true; it simply could not be done, and this on ordinary ⅜-in. × 20 s.w.g. drawn steel tube.

I now had ■ light and immensely strong chassis, without any parts to vibrate loose and cause running trouble.

Front suspension is by coiled springs, *via* duralumin half-clamps fixed to the gearbox and ⅛-in silver-steel radius arms. The knock-off switch is the Dubin 240 V, 3 A type, worked by ■ lever which takes the piano wire extension. It is ■ certain cut-out and is worth the trouble to fit.

The tank is L-shaped and the supply is taken from the off-side rear corner, and fed forward to the carburettor, *via* ■ copper pipe.

The back axle is ■ disappointment. It was originally designed to "float" on a central pivot; unfortunately, the wheel base was too short and the car was unstable during the trial runs, so the wheel base was lengthened to solve the problem. This was done by fitting ■ split dural block on to the back cross member and clamping the solid axle through it. This made the rear radius arms dummy, the pneumatic tyres taking the road shock.

The Z.N. ignition coil is clamped in a fibre support to ■ piece of sheet bakelite which in its turn is held by two screws to the channel cross member. Tethering arms were fitted last, and apart from the tank are the only parts that are not ■ fixture to the chassis and cross members. The hub nuts were turned to the section and the surplus material filed away.

The body is of 20-s.w.g. aluminium and was beaten in sections and welded, care being taken to roll the edges and strengthen the weak parts. It had some six coats of primer and filler, each one being baked on and rubbed down before the finishing coat—the result was worth the care taken. It is fitted to the chassis by only three 6-B.A. screws.

Details of the car are :—

Wheel base	11 in.
Track, front	7 in.
„ rear	6¾ in.
All-up weight	6 lb.
Z.N. wheels	3½ in. diameter pneumatic front and rear
Racing coil	Z.N.
Speed	50-60 m.p.h.

Comments

I do not use ■ booster battery to start: the Nife cells are always fully charged and topped up with Nife solution. They never fail me and give 2.4 V.

I start with ■ strap over the flywheel, having previously had trouble with the thong-in-groove method.

The engine has ■ tendency to flood owing to part gravity feed; and in competitions, when 3 min. are allowed for starting, I experience a certain amount of difficulty owing to the carburettor needle being offset and not too easily get-at-able.

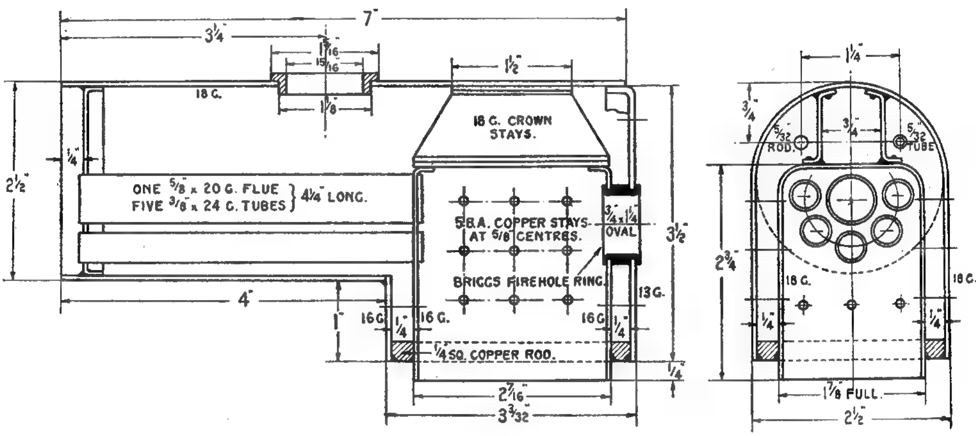
The car weighs more than anticipated, but makes up for it in looks.

"L.B.S.C.'s" Beginners' Corner

Boiler for "Tich"

IT is now time to initiate our beginner friends into the boilersmith's craft; but before doing so, maybe a few words on the subject of boilers in general, and locomotive boilers in particular, may be of assistance to them. In this, as in other branches of locomotive building, I speak from *actual personal experience,* having long since lost count of the number of boilers I have actually built, well over three figures; and of the whole lot, not one has ever failed to steam, and do all that was required of it, under every condition of service. This is plain honest fact, and no idle boast; hundreds of readers who have built "L.B.S.C.-designed" boilers, will confirm that, "with knobs on" as the kiddies would say. In my little dissertation on "spam-cans," I mentioned the old idea about putting the biggest possible boiler on a chassis, to get the steam required. Now in my experiments, I found that it wasn't always the biggest boiler that produced the most steam. Many of the "ancient-and-not-so-honourable" designs produced by so-called experts, were absolutely wretched steamers, despite their size. The reason was just this, in a nutshell. To make a boiler steam, and keep steaming, *the heating surface must be properly proportioned to the amount of water normally carried in the boiler.* This was the principal trouble with the shy steamers just mentioned. The designers had a fixed idea in their noddles, that on no account must the firebox crown be above the centre-line of the barrel; consequently, the top part of the firebox was badly restricted, and not only was there not sufficient space for proper combustion, but the large bulk of water above the crown sheet, "drowned" the box, in a manner of speaking, and kept the temperature down. Our departed friend Bro. "Iron-wire" Alexander exploded this fallacy before it was put forward (says Pat), as all his designs had high-crowned fireboxes, and steamed better than he claimed; they would have been better still, with a number of small tubes instead of one big tube.

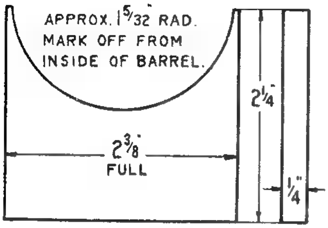
An experience of my childhood days will bear repeating for the benefit of new readers who did not follow the reminiscences published in these notes some years ago, in which I related how I was taught to drive a L.B. & S.C. Ry. "Terrier" tank engine before my thirteenth birthday, and was known to many drivers who ran these engines on the London suburban services. One Sunday evening a friendly driver at Victoria invited me to "work my passage home" to Queen's Road, Peckham, saying that his friend on the opposite turn told him I could manage fine with a seven-coach set on the East London line, and he wanted to see how I shaped with a ten-coach set on the South London line. Naturally I eagerly accepted, got up the 1 in 60 to the river bridge in fine style, and made the station stops in a manner which earned the driver's hearty approval. "Old man Billy" said, a child could drive any of his engines, and he certainly was right! Well, just after we left Clapham Road, I noticed that there was less than half-a-glass of water, so shut the pump bypass on my side of the footplate. The fireman saw this, and immediately said, "Don't shut it right off, kid, she steams much freer when there isn't so much water to keep hot." That simple remark solved a problem which had been puzzling me on one of my toy boilers; and it forms the basis of the boilers which I design and build.



Longitudinal section and cross section at firebox tubeplate of the boiler for "Tich"

The Secret is Temperature

Water boils in a domestic kettle at 212 deg. F., at or near sea level; and as long as the spout or other vent remains open to the atmosphere, the water won't get any hotter, but will be converted into steam, which will escape from the spout as fast as it is generated. If the spout is blocked up, so that the steam can't get out, it starts to accumulate under pressure, and the

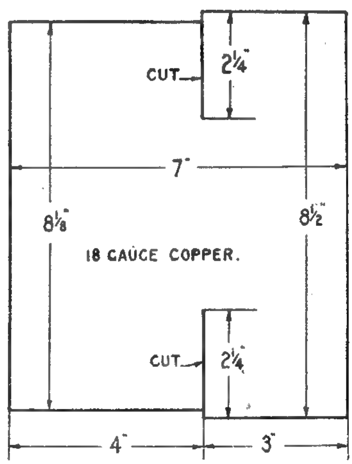


Throatplate

water begins to get hotter. In due course there would be a nobby old bang, and either the lid would blow off, or a new kettle would be needed. Now there is a fixed relationship between the pressure of the steam, and the temperature of the water, Without going into fractions or decimals, by the time the water has reached a temperature of, say, 300 deg., the steam pressure will be just over 70 lb.; and another 25 deg. on the water will bring the pressure to over 100 lb.

These simple facts have been known to engineers and scientists "ever since the year dot," to quote the kiddies once again; yet it apparently did not occur to the designers of the inefficient boilers mentioned above, to apply them to their designs. It doesn't need a Sherlock Holmes to deduce that if the *temperature* of the water can be maintained, you are going to get the steam, whatever the size of the boiler; within reason, of course. To cut a long story short, as Nat Gubbins would remark, all your humble servant did, was to proportion out grate area, heating surface, and water capacity, so that the temperature of the boiler could be maintained whilst sufficient steam was being drawn off to work the engine, and at the same time water was being fed in, to replace that evaporated into steam. It follows that if the cylinders and motion are arranged to do the maximum amount of work with a minimum amount of steam, an outsize in boilers is not needed. If anybody builds a copy, or alleged copy, of any full-sized engine, and puts a proportionately bigger boiler on it than that of its big sister (with or without any excuses!) it always makes me suspicious that the "works" are not quite as efficient as they should be, and therefore require more steam to do a given job. An excessive amount of steam drawn off from a boiler of given size, causes a bigger drop in the temperature than the boiler can sustain; consequently, down goes the steam pressure.

I hope that simple explanation clears the air for all beginners whose ideas about boilers are hazy. As an example of how it works out in practice, my old $3\frac{1}{2}$-in. gauge single-wheeler *Ancient Lights* has a boiler with a barrel 5 in. long and $2\frac{7}{8}$ in. diameter. The firebox is 3 in. long and $2\frac{1}{8}$ in. wide; there are seven $\frac{3}{8}$ in. tubes and a $\frac{5}{8}$ in. superheater flue. The cylinders are a little bigger in the bore than those of *Tich*, the stroke is a full $1\frac{1}{4}$ in., and the driving wheels just over 4 in. diameter. Bear in mind that she is a copy of an ancient type of express passenger engine—you'll see a picture of her in the new *Live Steam* book—and not a "pug" shunter like *Tich*; so, by the good rights, she should need plenty of steam for sustained high speed. Well, that old cat will start away, hauling my weight (equal to a load of 320 tons, far more than any of her full-sized sisters of early Victorian vintage could have ever shifted) with only 35 lb. on the clock, and a black fire. After the first few puffs, you can see the needle of the gauge moving around the scale to the point where it belongs; and long before one circuit of the line has been completed, the firehole door has to be opened, to keep the safety valves (one spring-balance and one direct-acting) from blowing off "ramping mad," as the Brighton enginemen used to call it. The reason is, that owing to the boiler being properly proportioned, the "therms" going into the water are far more than those being taken out by the steam being used, and the addition of cold water by the feed pump; consequently, up goes the boiler temperature, and with it the steam pressure. I know of a *Maid of Kent* which will



Boiler shell "in the flat"

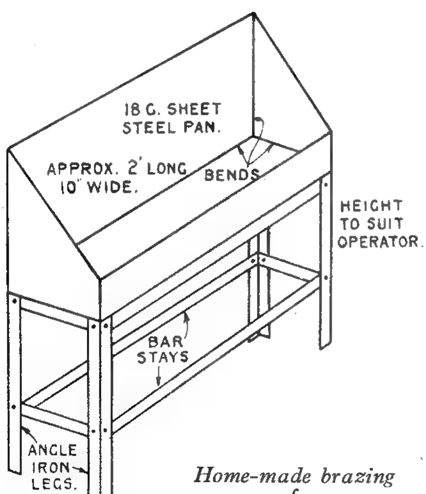
perform exactly the same antic with a proportionate load, but one would naturally expect good results in a modern type of engine in 5-in. gauge, whereas it seems extraordinary in such a weeny "old iron." Having investigated the whys and wherefores, let us take a look at the boiler for *Tich*, and then proceed to build it.

A Tiny But Lively Kettle

The construction is as simple as I can possibly make it, the barrel and outer wrapper of the firebox being made from 18-gauge sheet copper,

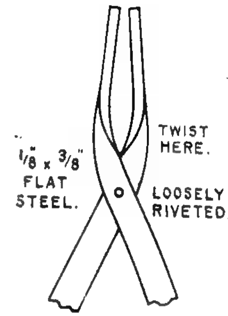
in one piece. The smokebox tubeplate, throatplate, and firebox end-plates are 16-gauge copper, and the backhead 13-gauge. The barrel is $2\frac{1}{2}$ in. diameter and 4 in. long, and contains five $\frac{3}{8}$ in. tubes and one $\frac{5}{8}$ in. superheater flue. The wrapper has straight sides. The inside firebox also has straight sides, with rounded top corners and a flat roof, all in one piece of 18-gauge copper. It is $2\frac{7}{16}$ in. long, a full $1\frac{7}{8}$ in. wide, and $2\frac{3}{4}$ in. high. There are nine copper stays each side, and three at each end, also two longitudinal stays between backhead and smokebox tubeplate. A large bush is fitted to the top of the barrel, for the dome, which will contain the regulator, as in full size practice. The firehole ring (Briggs pattern, forming a stout stay) is $\frac{3}{4}$ in. high and $1\frac{1}{4}$ in. long, oval in shape. As the pump eccentric comes right underneath the firebox when the boiler is erected, I have made special provision for its protection, but will deal with that when we come to it.

All the brazing of this little boiler can be done with a $2\frac{1}{2}$ pint paraffin blowlamp, or an equivalent air-gas blowpipe operated by fan or bellows. In addition, beginners will need something to use as a brazing pan or forge. An old discarded tea-tray makes an excellent brazing pan, if a piece of sheet iron about 8 or 9 in wide is bent to the shape of the edge of the tray, and fixed up at the back of it, to stop the coke or breeze from falling overboard. I use a home-made tray made from 18-gauge sheet steel, rectangular in shape, and large enough to take a $3\frac{1}{2}$ in. gauge Pacific boiler. It is approximately 2 ft. long and 10 in. wide. The front edge is bent up to a height of 3 in.; the back, to nearly a foot; and the sides slope up from front to back, a few iron



Home-made brazing forge

rivets holding the lot together at the corners. It stands on top of a pedestal-type cast-iron brazing forge, which I bought from Buck and Ryan's some 20 years ago; when I started in to make bigger boilers, such as $3\frac{1}{2}$-in. gauge *Princess Marina*, the tray proved too small, so we had to kind of "extend the premises." Any beginners could knock up the tray for themselves, mounting it on four legs made of angle-iron, with tie bars riveted at top and near bottom, just like the legs of the domestic kitchen table. It doesn't matter a bean how roughly it is made, as long as it does the job; if made to "mike" measurements, with chromium-plated legs and a rustless steel pan, it wouldn't make the brazing job any better, nor any worse, so why worry? The height should suit the operator's own stature; have it so that you can hold the blowlamp or blowpipe naturally, without causing fatigue. If too high, your arms will ache badly; if too low, you'll literally "get it in the neck."



Home-made tongs

The Tools and Materials Required

A fair-sized pair of blacksmith's tongs will be needed, to grab the boiler and turn it about when hot; also a small pair which can be home-made. Get two bits of flat steel, say $\frac{1}{8}$ in. $\times$ $\frac{3}{8}$ in. or nearest; length about a foot. Grip an inch of one end in the bench vice, and with a hefty pair of pliers, or an adjustable wrench clamped on the bar about $\frac{1}{2}$ in. from the vice, twist the projecting metal at right-angles. Rivet the two pieces together just below the twists, with a $\frac{1}{8}$-in. iron rivet, leaving the joint just free enough to move. If the ends above the twist don't meet, bend them a little until they do, and there is your "tongette"—ten minute's work at the outside, and at infinitesimal cost. A piece of $\frac{3}{16}$-in. iron wire about 2 ft. long, one end bent into a ring, and the other filed to a point, serves as a scratching wire, to break up bubbles caused by the flux in the molten metal. For brazing material, used on all the boiler joints except the tubes and bushes, either a good quality easy-running brazing strip, or Johnson-Matthey's B-6 brazing alloy, will be satisfactory. The latter is dearer, as it contains a percentage of silver, but it needs less heat, and flows very freely, so maybe some beginners would prefer to use it. As a flux for the former metal, I use "Boron" compo, a blue lumpy preparation sold in small tins; for the B-6, the makers sell a special flux called "Tenacity No. 3." For tubes and bushes, either best-grade silver-solder, with powdered borax as flux, or "Easyflo" and the special flux supplied by Johnson-Matthey's for use with it, does very well indeed. Both kinds of material are sold in sheet or strip form, the latter being the more convenient for our purpose; "Easyflo" is also sold as wire, and believe me it is just "the cat's whiskers" for making up boiler fittings. Even the most ham-fisted worker can make jewellery jobs of the fittings, with just ordinary care; but more about that when we come to it. A pair of ordinary pliers—preferably an old pair which have seen their best days on the bench—and a couple of small

jars, plus two or three tin lids, completes the outfit. Nothing to be scared of, is it?

How to Make the Barrel and Wrapper

First of all, may I assure all beginners that if they carefully follow the detailed notes and instructions for making this little boiler, and it turns out O.K., they need not have the slightest fear about tackling a boiler of any size within reason. The job is done in exactly the same way; the bigger boiler simply requires harder work to flange and bend the plates, and more heat for the brazing. The first stage of the proceedings is to cut out the plate for the boiler barrel and wrapper sheet, the latter being the boilermaker's term for the outer shell of the firebox. The dimensions of this, are shown on the accompanying drawing. The material is sheet copper of 18-gauge, which is a little thinner than $\frac{1}{16}$ in., and the copper should be quite soft, not the bright hard rolled variety. Our advertisers can supply it, or it can be purchased from any metal merchant's store, over the counter. They sell it by weight. Soft sheet copper of 18-gauge can be cut with an ordinary pair of tinman's shears or snips, by anybody whose wrists are of average strength. If you find it hard to cut, rig up an improvised bench shear. Put one handle of the snips in the bench vice, and put a length of iron gas pipe over the other handle; this will give enough leverage to enable a kiddy to cut the metal. Cut the edges straight, and note how far the two side cuts extend toward the middle of the sheet; don't make them more nor less than shown, as they should come just halfway up the barrel of the finished boiler shell.

If beginners can obtain a piece of hard wood, or anything else fairly strong, about $2\frac{3}{8}$ in. diameter, bending up the shell is just "a piece of cake." Young Curly found a stone ginger-beer bottle very handy for this purpose, and also used an iron sash-weight. Incidentally the latter makes a fine dolly for riveting up the barrel seam. First bend the whole sheet to semi-circular shape, like a tunnel; then continue bending the shorter end until it is completely circular, the edges overlapping approximately $\frac{1}{4}$ in. The outside diameter should then be $2\frac{1}{2}$ in., but it doesn't matter in the least if it is a little more; it should not be any less. Tie a bit of string or wire around each end, to stop it from springing open; then drill four No. 51 holes through the overlap, at $\frac{3}{4}$ in. centres, starting at $\frac{1}{2}$ in. from the end of the barrel. Put a piece of iron bar in the bench vice, letting it project about 4 in. from one side of the jaws. Put a $\frac{1}{16}$ in. copper rivet through the end holes in the overlap, head inside; rest the head on the bar, and hammer down the shank, to hold the overlapping parts into close contact. Ditto repeato with the other holes; then, if you have knocked the barrel out of its proper circular shape in the process, true it up again on the same bit of wood or other material over which you first bent it. The sides of the wrapper sheet should be nice and flat below the curved top.

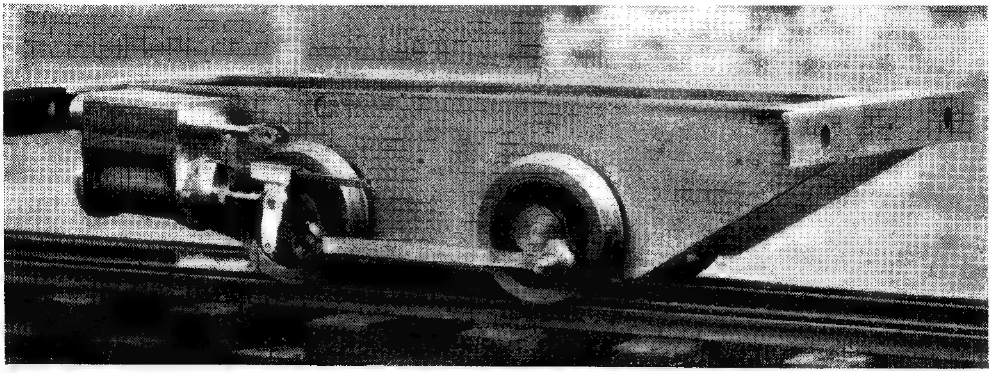


Photo by] [*L. J. Hibbert*

Built "on the quick"

How to Fit the Throatplate

In a boiler having a curved throatplate—that is, the plate that fills in the space between the sides of the wrapper below the barrel—it would be necessary to cut out the iron forming plate over which the backhead is flanged, and use it to form the throatplate also; but as our little throatplate has straight sides, the flanges can be bent in the bench vice. Cut out a piece of 16-gauge copper, $2\frac{7}{8}$ in. long, and $2\frac{1}{4}$ in. wide. Scribe a line at $\frac{1}{4}$ in. from each of the shorter sides; grip this strip in the bench vice, the line level with top of jaws, and bend to a right-angle. Warning: don't hammer direct on the copper, to get the bend sharp, but force it down as far as possible with your fingers; this is why we hold the short bit in the vice. Then get a stout bit of square bar, place it over the bend, and you can clout that as hard as you like. It will force the copper into a sharp bend without marking it.

Repeat operations on the other edge; the resulting flanged plate should measure a full $2\frac{3}{8}$ in. over the flanges, and should fit nicely in the gap below the barrel. Put it in place, and hold it by means of a toolmaker's cramp over the bottom of each flange and the sides of the wrapper.

(*Continued on page* 113)

TEST REPORTS

Some expert comments upon items submitted by the trade

The Richmond Rotary Machine Table

THOSE who visited THE MODEL ENGINEER Exhibition last year probably noticed the workmanlike appearance and excellent finish of the vertical slides and other appliances shown in the Trade Sample Section by Mr. A. F. Richmond, of Dunstable. We welcome, therefore, the opportunity afforded us of reporting on a rotary table submitted by this maker.

The Table

This member is shown in Fig. 2 resting on the circular plate fitted to hold the table in contact with the base casting.

The upper surface of the table is machined and scraped truly flat, as tested on a surface plate, and a series of rings at $\frac{1}{4}$-in. intervals are cut in the table surface to act as guides when centring the work. The T-slots are cleanly and accurately machined, and the graduation lines and numerals at the base of the table are clearly formed.

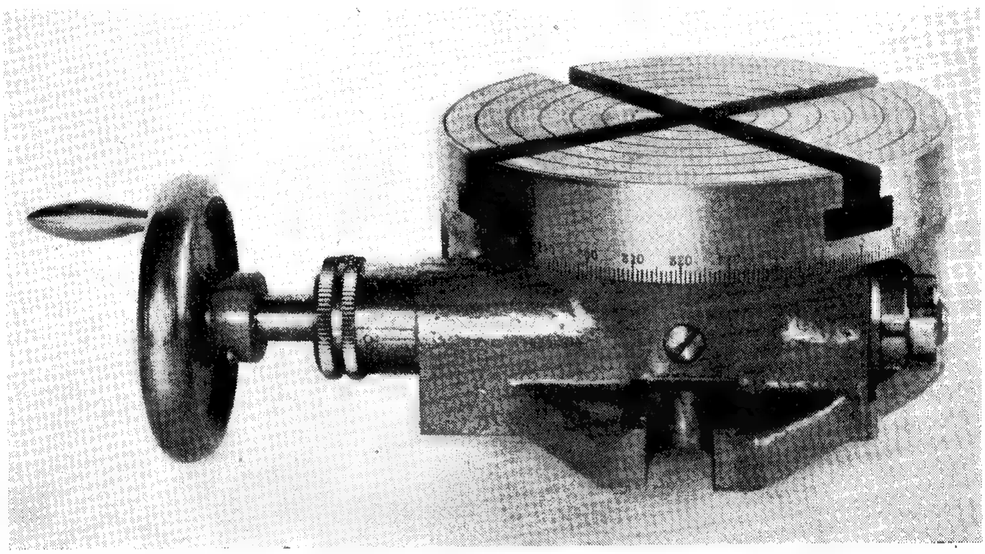


Fig. 1. The Richmond rotary table

The straightforward design, the high finish, and the quality of the workmanship throughout, serve as a reminder of the attachments for precision lathes and other best-quality fittings obtainable before the war. A general view of the appliance is shown in Fig. 1, where it will be seen that the circular, T-slotted table is carried on a base casting provided with lugs for bolting to the machine table. The table is rotated by means of the hand-wheel fitted to the end of the worm shaft.

General Dimensions

The table is 4 in. in diameter and is furnished with four radial T-slots to accommodate $\frac{5}{16}$ in. dia. T-bolts. The depth of the table is $\frac{3}{4}$ in., and at its base the table is graduated into 360 divisions. The overall height of the appliance is 2 in., and the base lugs provide for bolting centres of $4\frac{3}{4}$ in. and upwards.

The register portion of the table is $2\frac{1}{2}$ in. in diameter and 1 in. in length. The fit of this register in the base casting is extremely close; so much so, that the parts must be carefully held in true axial alignment to enable them to be assembled, yet the table when in position turns freely and quite smoothly.

The Base

This part is a rigid casting, accurately machined on both its upper and lower surfaces; the bolting-lugs are also well machined on all faces. The tunnel which forms the worm-shaft bearing is lapped to a good finish and is fitted at its far end with a cast-iron bush, also internally lapped.

To maintain the lubrication of the bearing, a shallow oil-groove is cut in the wall on the

housing, and oil is supplied to the worm and the shaft bearings through a hole drilled in the casting and closed by a screw.

The device fitted to the base, for clamping and locking the table, deserves notice, for, instead of the ordinary cylindrical pad-piece, a bronze pad of crescentic form is closely fitted into a

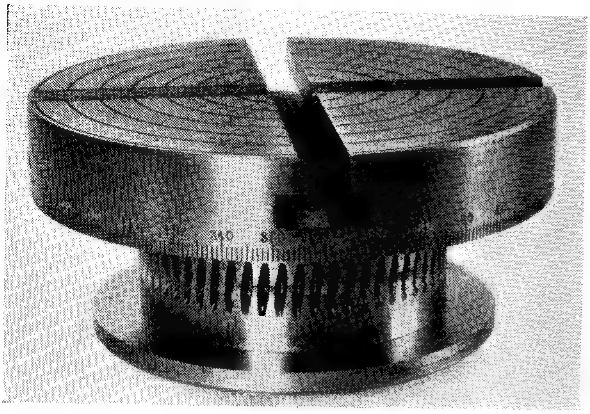


Fig. 2. The graduated table with its worm wheel and retaining plate

corresponding slot milled in the base casting. This pad can be seen in Fig. 3, resting on the casting beside its slot.

The bronze pad-piece is pressed into engagement by means of a knurled screw provided with a cross-centre hole to take a tommy-bar.

The Worm Shaft

The assembly comprising the worm shaft and its fittings is illustrated in Fig. 4. The larger bearing portion of the shaft is $\frac{9}{16}$ in. in diameter and $1\frac{3}{8}$ in. long, and the smaller at the tail end of the shaft is $\frac{3}{8}$ in. in diameter by $\frac{3}{4}$ in. long. These bearing surfaces on the shaft have been given a fine finish, and the bearings themselves are a close and accurate fit. The polished handwheel is secured to the shaft by a cross taper pin. The knurled index is fitted with a grub-screw for locking the collar to the shaft; but, here, it is suggested that a bronze pad-piece and spring should be used in order to protect the shaft and, at the same time, to afford the index a light frictional grip. The graduation lines and the numerals on the index collar are cleanly cut and can be clearly read. The worm itself, formed integrally with the shaft, has highly-finished contact surfaces, such as are usually obtained by a lapping process. The threaded end of the worm shaft carries two slotted collars for adjusting the end-float of the worm.

The Circular Feed

The base of the table is graduated into 360 divisions, each, of course, representing 1 deg. of angular movement, and one turn of the worm shaft rotates the table 6 deg. As the index collar has six main divisions, each of these graduations will denote 1 deg. of movement. The collar is further subdivided into thirty-six divisions, so that 10 min. of angular movement can be indexed. The worm gearing was free from backlash, and the table-locking device was found to be fully effective.

Testing the Appliance

As it is highly important, in an attachment of this kind, that the surface of the table should at all times remain exactly parallel with the base, the parallelism of these parts was tested on the surface plate. It was then found that the test indicator, when brought to bear on the table at four points at right-angles to one another, showed no detectable variation of reading. A similar result was obtained when this test was repeated with the table rotated by its feed screw through 90 deg. and 180 deg.

The Rotary Table in Use

On the milling machine and shaper, the appliance can be used for rotary milling and for machining slots and surfaces at various angles to one another. It is also well adapted for cutting the teeth of mating dog-clutches and similar work. Moreover, work mounted on the table can be rotated so as to align a datum surface used as a reference surface for further machining

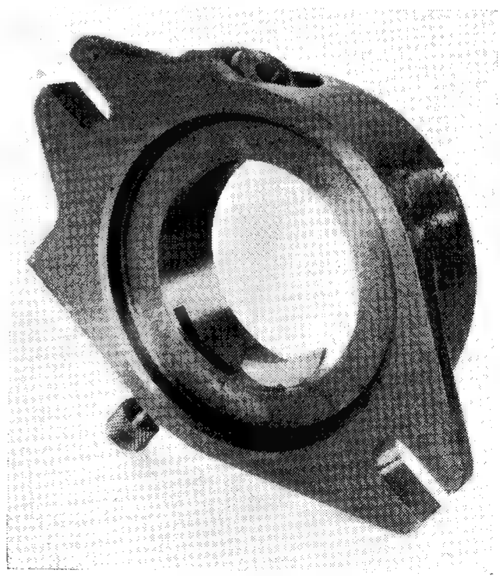


Fig. 3. Showing details of the table clamping device

operations. When mounted on the table of the drilling machine, the appliance enables holes to be indexed and drilled on any required pitch circle.

The overall height of the table, 2 in., limits the

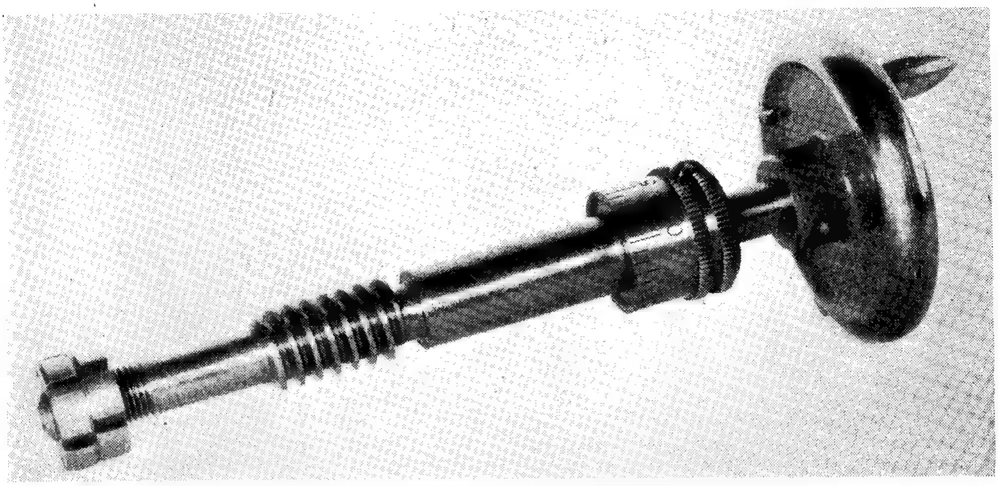


Fig. 4. The worm shaft assembly

use of the appliance when attached to the cross-slide of a small lathe, but, when secured to a vertical milling-slide, the device has been found capable of dealing with a large variety of work.

Conclusion

Although it is a purely personal preference and the mechanical efficiency of the appliance is not affected thereby, we would rather see recessed, cheese-headed screws used to secure the retaining plate at the lower end of the table, instead of the countersunk screws fitted ; this would be more in keeping with the rest of the construction and would also conform to instrument-making practice. A highly finished piece of work, such as this, merits rather better painting, and the application of one or more additional filling coats would obliterate the surface irregularities in the casting and produce a smooth finished surface. The simple, straightforward design and good workmanship, in conjunction with the ample, accurately fitted bearings, should ensure that this rotary table will give lasting satisfaction even under exacting conditions in the workshop.

"L.B.S.C."

(*Continued from page* 110)

The plates, of course, should be flush at the bottom. Now put a scriber down the barrel, and scratch a line on the embryo throatplate, running the scriber point around close to the lower half of the barrel. Remove the plate, and cut the piece out, leaving the line just showing. This can be done with a metal-piercing fretsaw, or coping saw, as it is often called ; merely a glorified fretsaw. I do jobs like these on my Driver jigsaw (a thunder-and-lightning edition of a woodworker's fretsaw machine, which will walk through $\frac{1}{8}$-in. brass plate) but a hand fretsaw with a metal-cutting blade in it, does the job quite well. Anoint the blade with beeswax if it tends to clog or jam. An "Abrafile," which is a piece of thin steel wire with file teeth formed on it, and is held in a hacksaw frame, will take out the superfluous piece of copper in two wags of a dog's tail. If you haven't any of the above, just drill a row of No. 40 or 3/32 in. holes close to the line, break out the piece (chopping between the holes with a little chisel made from $\frac{3}{16}$-in. silver-steel) and file the rough edge, so that the line is just left showing.

Well clean all around the cut, with coarse emerycloth or similar abrasive, and also clean the edge of the barrel, and the front inside edges of the wrapper sheet. The throatplate edges may be cleaned up with a file, second-cut grade for preference. Don't forget that successful brazing needs perfectly clean joints ; so wherever I give instructions for fitting parts together for brazing or silver-soldering, "take it as read" that they must be as clean as possible, even though nothing is said about it at the time. As I've remarked before, I give all novices full credit for possessing average "gumption," and it is in cases like this where I assume they exercise it. My old schoolteacher said much the same thing to the class ; we kids appreciated his confidence, and took jolly good care never to let him down, which he appreciated in his turn. After cleaning, put the throatplate in place, with the semi-circular edge butting tightly up against the barrel ; drill three No. 51 holes in each flange, put $\frac{1}{16}$-in. copper rivets in from the inside, and rivet up, same as the longitudinal seam. We are then ready for the first brazing job ; and this will be described in full, all being well, in a later issue.

Novices' Corner

Clamps

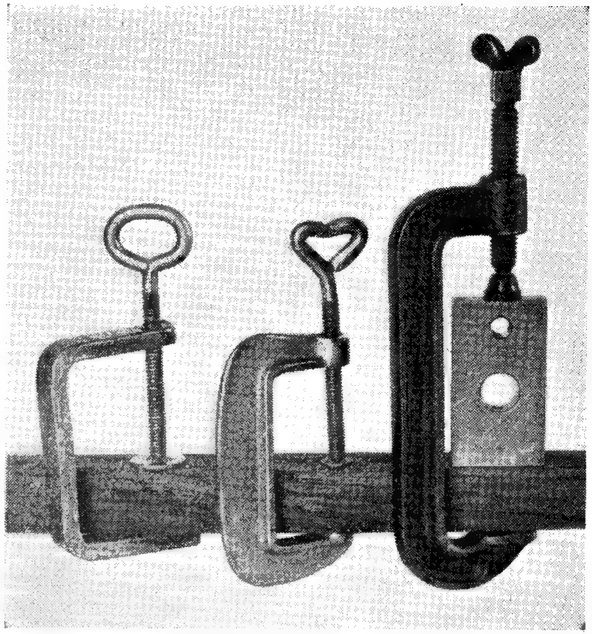


Fig. 1

SCREW clamps of various patterns have many uses in the workshop in aiding both machining and hand-fitting operations carried out on small as well as on large pieces of work. For example, these tools may be employed to secure work to the table of the drilling machine, or parts may be clamped together to ensure that a series of holes to receive screws or rivets will be drilled exactly in line in the two components. Further, during the construction and assembly of mechanical parts, the components can be temporarily clamped together in their correct positions to enable them to be marked-out for machining.

The C-Clamp

The simplest form of clamp is the C-clamp illustrated in Fig. 1, where three different patterns are shown; that on the left is suitable for light holding only and is chiefly used for woodwork; the centre clamp is of rather more robust construction and has a malleable-iron frame: nevertheless, it should be tightened on the work with finger pressure only, for, if a tommy-bar is used with either this or the previous pattern in an attempt to exert greater clamping pressure, the frame will be sprung or even broken if made of brittle material. The clamp shown on the right is more suitable for metal working, as it is designed to withstand moderately heavy clamping pressure, and as will also be noticed, the screw is formed with a squared collar below the winged portion to enable a spanner to be used for obtaining greater leverage.

The pair of mild-steel clamps illustrated in Fig. 2 were specially made in the workshop for securing a batch of parts to the drilling machine table; it will be apparent that their heavy con-

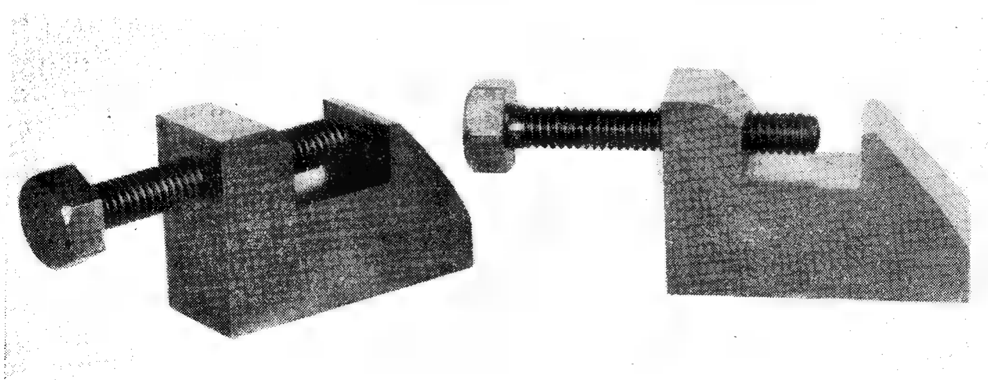


Fig. 2

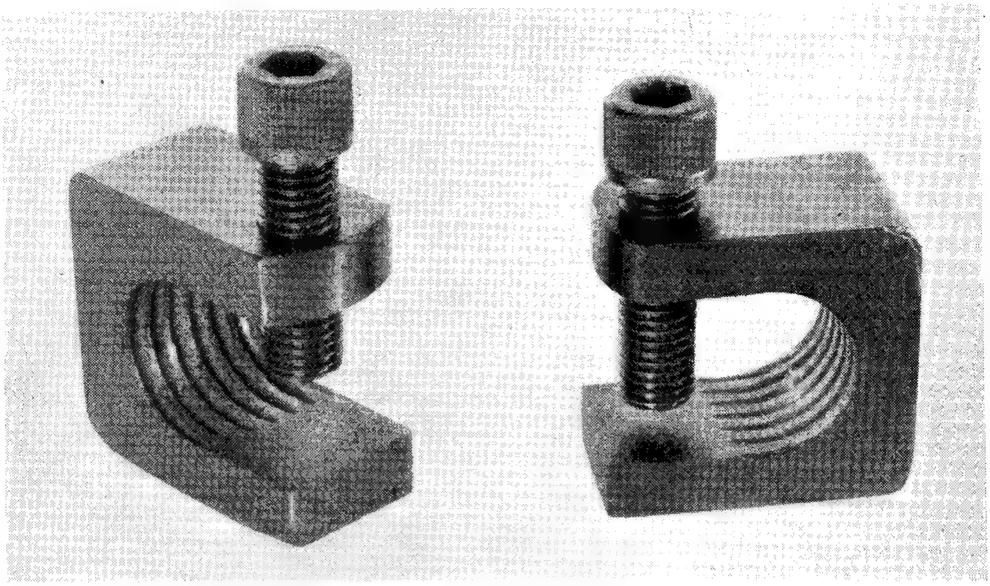


Fig. 3

struction does not permit any bending of the frame, and at the same time the hexagon-headed clamp-screw allows great pressure to be applied. The small C-clamps shown in Fig. 3 have ample strength for holding all kinds of light work and, moreover, they can easily be made in the workshop from standard parts. The frame is constructed from an ordinary square steel nut in which a gap is cut out with a hacksaw, and an Allen screw is fitted to provide the clamping pressure. To give a neat appearance, the frame should be filed all over to a smooth finish, and, if desired, this part can be blued by heating it on a gas ring, until the correct colour is obtained, and then dipping it in oil or wiping with an oily rag.

The Toolmakers' Clamp

The most generally useful form of clamp in the small workshop is, perhaps, the toolmakers' clamp illustrated in Fig. 4. These tools are made in many sizes, and those manufactured by Messrs. Moore and Wright have a jaw-length ranging from 2 in. to 5 in. with a jaw opening

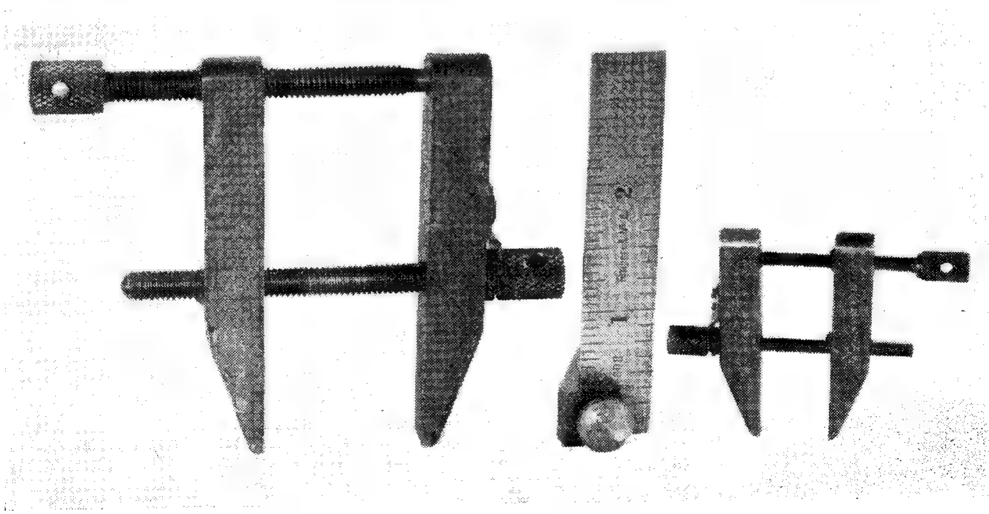


Fig. 4

of 1 in. and 3½ in. respectively. When using these clamps for gripping small parts, it is often important that the jaws should encroach as little as possible on the work in order to allow drilling and other operations to be carried out; in this connection the small Starrett clamp, seen at the

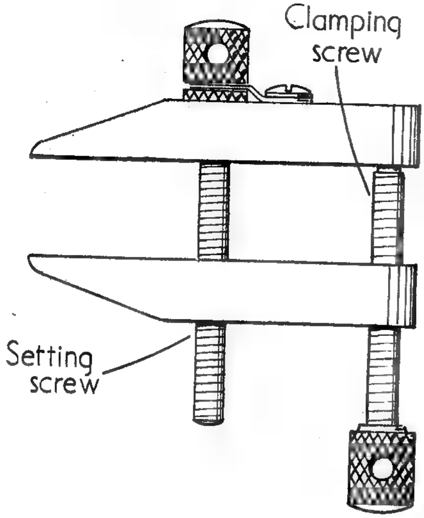


Fig. 5. Showing the parts of a toolmaker's clamp

right of the photograph, will be found particularly useful, as the jaws are only 1⅝ in. in length and ¼ in. wide.

The constructional details of the usual form of this clamp are given in Fig. 5. The central setting-screw passes through a clearance hole drilled in the upper jaw, and, for convenience of handling, this jaw is kept in contact with the head of the screw by means of ■ small bridle; the lower end of the screw fits into ■ threaded hole formed in the lower jaw.

The clamping-screw is threaded in the lower jaw and its tip enters a plain hole drilled in the upper jaw. The heads of both screws are provided with ■ cross-hole for ■ small tommy-bar to give increased leverage for tightening the clamp.

When applying the clamp to a piece of work, the jaws should first be set to approximately the correct opening. Some workers adopt the laborious method of turning first one screw and then the other a little at a time, for, if the clamping-screw is withdrawn too far, the tip will leave its recess and the jaws themselves will be free to rotate.

Adjusting

A quicker way of adjusting the clamp is to grip the head of the setting-screw with the thumb and forefinger of one hand and the clamping-screw with the fingers of the other hand; if the clamp is now turned like a skipping rope in ■ direction away from the body, the jaws will close and, at the same time, the two screws will keep in step as it were; rotation of the clamp in the opposite direction will, of course, open the jaws in ■ similar manner. Next, the setting-screw is used, as illustrated in Fig. 6, to close the jaws evenly on the work, and if necessary the clamping-screw must be further slackened to set the jaws parallel. Now lightly tighten the clamping-screw and if only the tips of the jaws then press on the work, as in the left-hand figure, the clamping-screw must be slackened and the setting-screw further tightened.

The centre figure shows the effect of over-tightening the setting-screw with the clamping-screw incorrectly adjusted.

The correct setting of the jaws can usually be determined quite readily by touch, for, when the clamping-screw is moderately tight, it should not be possible to swing the clamp easily to one side; whereas, if the setting-screw is wrongly adjusted, the clamp will pivot freely either on the tips of the jaws or on the edge of the work, as represented in the drawings.

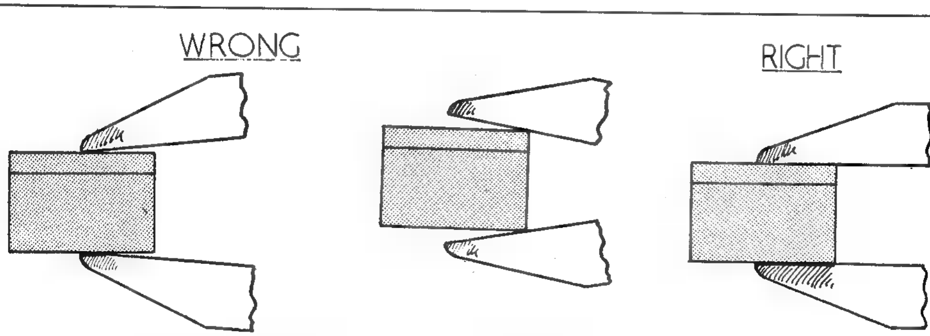
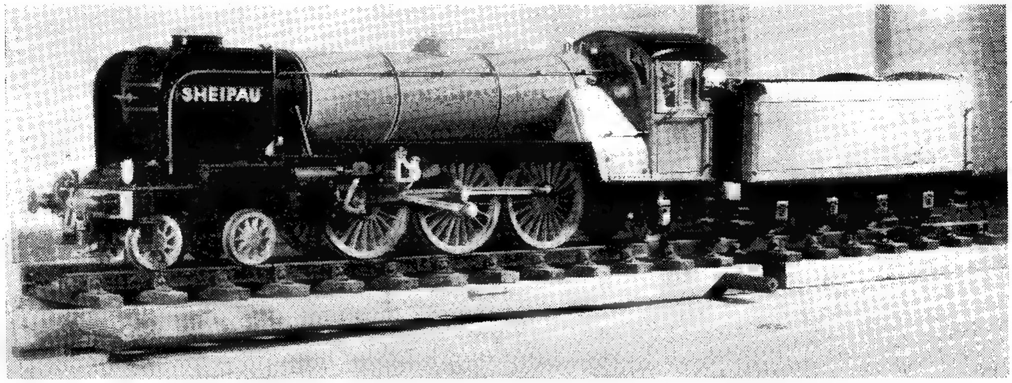


Fig. 6. Method of applying a toolmaker's clamp to the work

The final step is to tighten the clamping-screw with a small tommy-bar, and then to check the grip by trying to swing the clamp sideways with the fingers. When properly applied and firmly tightened, the clamp will grip securely and there will then be but little danger of its being displaced during any machining operations subsequently carried out on the work.

"Sheipau" Takes a Bow

by G. Nash



What's in a name?—The author's daughter's christian names

IT has always been my ambition to build a live steam locomotive, and I had just begun on a free-lance 2-4-0 in $2\frac{1}{2}$-in. gauge, when "L.B.S.C.'s" *Hielan' Lassie* made its appearance in THE MODEL ENGINEER. This interested me so much that the free-lance job was shelved, and a start on "L.B.S.C.'s" latest was made in 1947. I was very fortunate in having the opportunity of inspecting the prototype at any time I wished, so, although I have followed the "words and music" in the main essentials, I have departed in several instances so as to keep the to the prototype as far as possible. Full Walschaert's valve-gear is fitted. The expansion link is double-sided, and the link brackets are fabricated, as I think that they make a much better job than if cast. The return crank has roller-races. Radial boxes were fitted on trailing frames, also the spring steadying bolster was utilised, which keeps the leaf springs always upright.

Steam cocks were added to the cylinders as an experiment, ball-valves on one side and mushroom-valves on the other.

The construction of the tender was next tackled, and completed without difficulty. The sides are 3/32 in. and the soleplate $\frac{1}{8}$ in. All springs on the tender are working leaf springs.

Boiler-making

Now for the boiler—my first attempt. The actual making did not prove difficult, but there are several "snags." I failed the first time—the old trouble, the combustion chamber. This "died" under test owing to a fracture occurring around the tubeplate flange. As one is unable to get at this particular point, this fault meant a fresh start, and after collecting sufficient material, another attempt was made. My wife assisted me by managing the "five-pinter" a a pre-heater, whilst I controlled the oxy-coal gas pipe. The brazing was carried out with "Sil-fos," a material that requires no flux, and was highly successful. The staying of the firebox was dealt with next, and luck stayed with me. Wash-out plugs were fitted. Then came the anxious moment, when every model engineer holds his breadth and hopes for the best. The boiler was filled and pumped up to 200 lb. per sq. in. hydraulic—everything "O.K." Cheers!

The Firebox

The ashpan slopes forward like a chute, and the fire-bars are also made to drop forward. This makes it easier to rake through the firehole, and ash and cinders are shot clear without any trouble. Assembly was fairly straightforward. Running boards are of $\frac{1}{16}$-in. steel. The boiler lagging was made from a brass tube, $\frac{1}{16}$ in. thick, split down the centre. The fitting of this proved a little difficult, but in my opinion makes a far better job than a thin sheet. Finally, the engine wanted a name, and this was concocted from the names of my two daughters—Sheila and Pauline. The letters were cut out separately and brazed on to the back-boards, and then fitted to the smokeshields. A proper test-stand was made, and when the engine and tender were completed in October, 1949, it was put through its paces. It has now had many tests, and has proved satisfactory in every way.

Queries and Replies

Enquiries from readers, either on technical matters connected with model engineering, or referring to supplies or trade services, are dealt with in this department. Each letter must be accompanied by stamped, addressed envelope, and addressed: "Queries Dept." THE MODEL ENGINEER, 23, Great Queen Street, London, W.C.2.

Queries of a practical character, within the scope of this journal, and capable of being dealt with in a brief reply, will be answered free of charge.

More involved technical queries, requiring special investigation or research, will be dealt with according to their general interest to readers, possibly by a short explanatory article in an early issue. In some cases the letters may be published, inviting the assistance of other readers.

Where the technical information required involves the services of an outside specialist or consultant, a fee may be charged depending upon the time and trouble involved. The amount estimated will be quoted before dealing with the query.

Only one general subject can be dealt with in a single query; but subdivision of details into not more than five separate questions is permissible. In no case can purely hypothetical queries, such as examination questions, be considered within the scope of this service.

No. 9832.—Container Capacities
E.G.O. (Bath)

Q.—What would be the cubic capacity of two separate containers, one to hold ten tons of Welsh steam coal, the other holding 5,000 gallons of water?

R.—Welsh steam coal which requires approximately 40 cu. ft. per ton would require 400 cu. ft. for 10 tons. 5,000 gallons of water reckoned at approximately $6\frac{1}{4}$ gallon per cu. ft. would require 800 cu. ft.

No. 9835.—A.C. Induction Motors
J.A.B. (Wincanton)

Q.—I have bought a 1/3 h.p. Mark I Hoover Induction Motor, and would like you to explain the principle on which these a.c. motors run. I cannot quite see how the running speed of 1,425 r.p.m. is related to any multiple or division of 50 cycles a second, or 3,000 cycles a minute. Again, what is the manner of operation of the starting windings, cut out by a centrifugal switch; and finally, what is the meaning of the rather provoking words, "Capacitor-Start," which is often darkly connected with condenser failure.

R.—Alternating current induction motors utilise the current set up by induction in the short-circuited armature to produce electro-magnetic attraction and repulsion. The normal tendency of such motors is to run synchronously according to the frequency of the supply, but a certain amount of lag or slip takes place, which reduces the running speed to a certain extent. In the case of motors running at 1,425 r.p.m. the motor has four poles, and if running synchronously would run at 1,500 r.p.m. so that 75 r.p.m. are lost by slip. In order to start these motors from rest, a starting winding, having a different inductance to the main winding, is used to produce magnetic poles between the main running poles, and this produces a rotary effect. The centrifugal switch cuts the starting winding out of action as soon as running speed is obtained.

Capacitor-start motors utilise a condenser in series with the starting winding, which assists in producing a better starting torque. These brief details should help you to understand the basic principle of the motor, but for a more complete description, we advise you to consult text books on this subject.

No. 9838.—The Tap Wrench
P.G.G. (Rempstone)

Q.—Recently, a few friends and I were discussing various small tools in the workshop, and someone mentioned the uninspiring but all important tap wrench. It was agreed that the adjustable type (within reason—say 0-$\frac{1}{2}$ in. capacity) was the only one worth considering, but just how was it to be made adjustable? This caused much debate, and one member advocated a tap wrench, the handles of which were adjustable for length, and interconnected with the actual jaws for holding the tap, the idea apparently being that this would be a safety mechanism to end the broken tap menace by governing the amount of leverage which it would be possible to apply to the tap in use. I would be interested if you would give your views on the subject and mention any more unusual mechanisms in the guise of tap wrenches which you may know of.

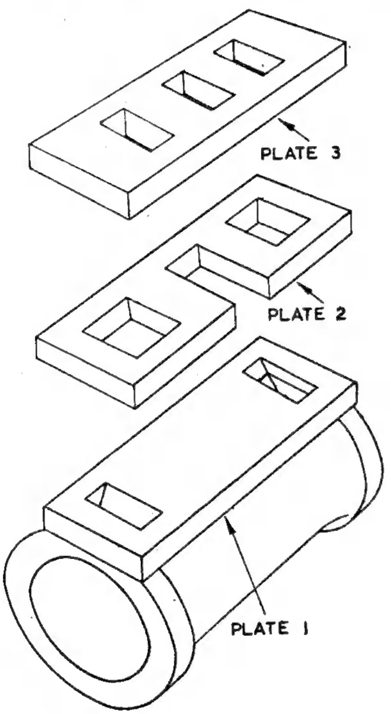
R.—It would be theoretically desirable to devise a tap wrench so that the amount of leverage which can be obtained with it was proportional to the torque required for tapping, but in practice this result would be extremely difficult to obtain, and as a matter of fact, it still would not be proof against brute force in using the wrench. The most satisfactory type of tap wrench for small taps, in our opinion, is the balanced T-handle type with a chuck to hold the tap. The usual form of chuck is the two-jaw type as used on carpenters' braces, suitable for holding square shanks. For very small taps which require very delicate handling, even this type of holder is not sufficiently sensitive, and we recommend a small knurled knob similar to an electrical terminal with a set-screw so that it

can be clamped on to the shank of the tap. We do not claim that this supplies your requirements of the perfect adjustable tap wrench, but for practical requirements, it is often necessary to arrive at a compromise which falls far short of what is ideally desirable.

No. 9833.—Fabricating Engines C.B. (W. Kensington)

Q.—I was very interested in the article by Mr. R. Howe in which he described his slide valve engine. Could you supply a sketch of the two plates used in fabricating the cylinder?

R.—The sketches show the usual way of fabricating steam engine cylinders though we cannot be quite certain that it is exactly the method that is referred to by Mr. Howe.



No. 9837.—"Warrior" Engine Construction H.A.H. (Bournemouth)

Q.—I would be very grateful for your advice on the building of the "Warrior" engine. In the general arrangement :—

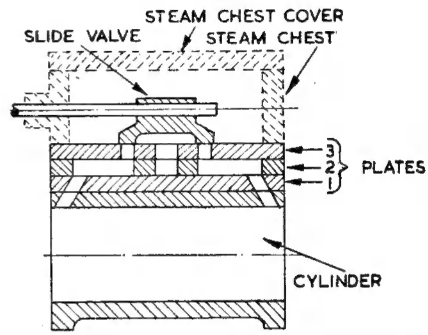
(*a*) Two stop-cocks are shown fitted on top of each cylinder and yet no further reference is made to them in the blueprint. Are they necessary and what purpose do they serve?

(*b*) A piston ring is shown in the sectional elevation, but detail 10 shows no such ring. Is this also necessary, and if so of what material should it be made?

In details 2 and 5, four corresponding holes are shown drilled No. 34, yet none are presumably tapped and no bolts are shown in the general arrangement. Is it correct that those in the lower cylinder cover should be tapped in order to secure the cylinder block to the trunk column? In the plan of detail 21, there appears to be a $\frac{1}{8}$ in. diameter hole (undimensioned) in the 13/16 in. × $\frac{5}{16}$ in. block. Is this a misprint and ought it to be ignored? It also mentions that a hole in that block should be drilled No. 30 and tapped to suit a valve. Would you please advise me on the size and type of valve suitable?

In detail 3, what is the purpose of the four holes shown tapped 10 B.A.? Finally, are the two cylinder blocks connected in any way, apart from the "Y" exhaust pipes, in the assembled model?

R.—(*a*) The two stop-cocks on the top of the engine cylinders are intended for introducing oil to the cylinders before starting, and they can also be used to serve as drains when warming the engine through. They are not absolutely essential but will be found generally desirable.



(*b*) Either a single piston ring or soft graphite packing can be used on the pistons. As this is an optional feature, no exact details have been given on the detail drawings. If a piston ring is used, it may be made either of cast-iron or hard bronze.

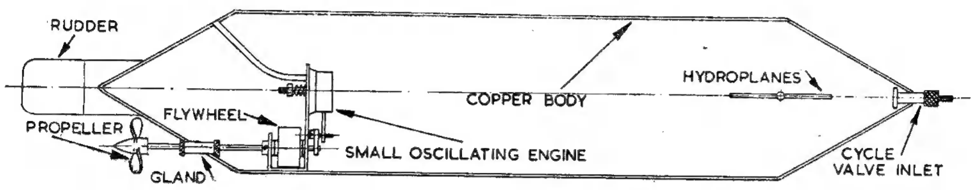
The four holes in the corners of the lower cylinder cover (item No. 5) are clearance holes corresponding with the holes in the top of the trunk column (item No. 2) for the purpose of holding the cylinder in position. These are normally intended to take bolts passing through both the flanges; but if desired, one of the parts can be tapped and screws fitted.

The lower cylinder cover is attached to the cylinder by six screws tapped into the underside of the latter. In the plan view of detail No. 21, the $\frac{1}{8}$ in. hole shown is really intended to be dotted to represent the inlet hole from the underside. The hole which is specified as being tapped to suit a valve is in actual fact used for connecting the displacement lubricator to the side of the T-piece in the steam distribution pipe. The four holes shown tapped 10 B.A. in detail 3 are intended for the attachment of the lagging plate, which is used to hold insulating material on the outside of the cylinder to prevent loss of heat. The two cylinder blocks of this engine are not positively connected together, though both the exhaust pipes and the oil box serve to hold them together to some extent.

PRACTICAL LETTERS

Model Submarines

DEAR SIR,—Reading Mr. Walter's letter on this subject, took me back to my childhood, when my brother and I used to make rubber-driven boats (submarines and others). At that time, a box of elastic bands as used in offices was a most appreciated gift.



But I would like to mention another source of power to drive a submarine, i.e. compressed air. I built a very successful experimental submarine with the following characteristics : The body was made of an airtight copper tube about 5 in. diameter and 2 ft. long, with both ends pointed. Inside was a small oscillating engine, the " admission " port of which was connected to the open air by a small copper pipe. Ballast was added to leave very little buoyancy. By pumping air through a cycle valve, it was possible to obtain sufficient pressure for a run. The engine worked very satisfactorily, being surrounded by compressed air. Lubrication was carried out via the exhaust pipe, the propeller being turned backwards. Its course under water could be followed by the air bubbles coming to the surface. One day, this boat was lost with all hands in the Lake of Geneva, presumably caught by weeds, but years later, it was seen in the cellar of a fisherman, who was sure he had found some kind of a torpedo. It is still there !

Yours faithfully,

Morges, Switzerland. J. C. PIQUET.

Sparking Plugs

DEAR SIR,—There have been several very good articles in THE MODEL ENGINEER recently, on the maintenance of high speed model racing cars, and one in particular drew attention to the fact that a large percentage of failures at competitions was due to electrical faults.

As a keen follower and user of British equipment wherever possible, I have noticed that British sparking plugs either break up through being too soft or oil up owing to lack of clearance between porcelain and frame. In almost all cases where American plugs have been substituted, perfect performance has resulted.

I feel that with a little co-operation from our plug manufacturers these faults could be quickly remedied.

Yours faithfully,

Bolton. J. W. RIDING.

Model Outboards

DEAR SIR,—I read with much interest the article on the model outboard engine. This is, in my opinion, an engine that might well be encouraged both for racing and utility purposes, such as steering and nomination competitions, to say nothing of the constructional interest. There are at present many designs of engine in service with vastly different features, such as the 350 c.c. single-cylinder port admission two-stroke, Water Mata, or the Johnson 350 c.c. horizontally-opposed twin with a rotary valve geared from the crankshaft and running at half engine speed. We could also turn to the Johnson 229 c.c. alternate firing Racing " A " which has two cylinders in one block and a rotary valve formed in the centre web of the crankshaft. This engine is, by the way, rated by the makers at 12 h.p. and is capable of running at a steady 7,500 r.p.m. The suggested capacity of the models of 2.5 c.c. seems rather small, and I personally would prefer it to be 5 c.c., which would give more scope on a twin-cylinder engine. I notice that Mr. Caird has on his engine a bevel box gear ratio of 1 × 1. In full-size practice it has been found more efficient to gear down to the propeller, the usual gear ratio being 21 × 12 on a utility engine and 19 × 13 on a racing unit. With regard to the hull, it would be necessary to depart from the type of hull we are using now in favour of one with maximum beam at the transom and very little wetted surface forward, the step being about half way along the length of hull, as on the Jacoby, Ralos and Crandell type hulls.

I would mention that the anti-cavitation plate mentioned in the article by Mr. Westbury is a very necessary item on a racing unit, both from the point of stopping cavitation and of stabilising the hull to a small extent, the plate being adjusted to run level with course of the hull.

Just as a matter of interest I would mention that apart from running 5 c.c. units, I also have a " B " class outboard unit in which I was second in last year's British championship, apart from winning both the Earl Howe and the Redex Trophies, and the East Coast Utility " B " championship. I should be only too pleased to offer any help that I can on this very worthy cause.

Yours faithfully,

Lowestoft. D. A. JULES

Flash Steam Plants

DEAR SIR,—In describing the performance of his flash steam plant, Mr. Nurthen mentions the tendency of the engine to "take off." This indicates a lack of balance which is avoidable.

If the rotating weight and half the reciprocating weight are balanced in the usual way, the primary inertia forces in a 90 deg. Vee-twin are in equilibrium at all crank positions.

Yours faithfully,

Rugby. "CASSIUS."

CLUB ANNOUNCEMENTS

Salisbury and District Model Engineer Society

There was a slight drop in attendance compared with other years at the society's third exhibition held recently, nevertheless nearly 1,600 visitors attended and 1,736 rides were given behind Mr. C. S. Barnett's $7\frac{1}{4}$ in. gauge "Royal Scot."

Noteworthy models among the 100 or so on show were Mr. J. Perrier's $3\frac{1}{2}$ in. gauge Gresley Pacific Class "A10," Mr. R. S. Holman's group of five different steam engines with boiler and pump, among which the swash-plate engine took the public fancy, and Mr. Puntis's four-cylinder water-cooled petrol engine. Besides Mr. Holman's models, Mr. O. T. Wicks' showman's tractor and two mill engines were working on compressed air, and among the other working models were Mr. A. Sheppard's (junior) oscillator under steam, Mr. G. D. Lovell's 5 c.c. four-stroke water-cooled petrol engine coupled to a 20 volt generator, and his "O" gauge G.W. "King" class locomotive which ran under steam on a 60 ft. straight track and succeeded in hauling a 15 stone man.

Special stands were provided by Wellworthy Piston Rings Ltd., local model and tool shops, and a technical bookstall by W. H. Smith & Sons.

Excellent support was received from societies in the Southern Federation of Model Engineers (Andover, Chichester, Eastleigh, Lymington, Southampton and Totton and New Forest) and from the Trowbridge Society, and a number of unattached model engineers.

Mr. M. W. Richardson, managing director of Autotrope Ltd., performed the opening ceremony and deplored the fact that the society had received no help in furthering its activities from the local authority or the local technical college.

Hon. Secretary: R. A. Read, 7, De Vaux Place, Salisbury.

The Staines and District Society of Model Engineers and Craftsmen

Despite a recent lapse in publicity, the society continues to function well. Meetings are well attended, and the live steam section continues to be inundated with requests for fetes, etc. A further length of portable track is being constructed and will bring the total up to 250 ft. A new badge has been designed and supplies are now to hand. The near future programme is as follows:—

August 2nd. Mr. Pledger will answer any questions on the maintenance and overhaul of i.c. engines.

August 16th. "My 'Princess Marina' Thus Far." Mr. Allard.

September 6th. Exhibition night.

September 20th. Description of a home-made milling spindle for lathe or shaper. Mr. Allard.

The committee have an eye to an interesting series of programmes for the coming winter, and lone hands interested should contact the Hon. Secretary, R. F. SLADE, 166, Kingston Road, Staines, Middx.

South London Model Engineering Society

The South London Model Engineering and Power Boat Club will hold their regatta on Sunday, July 23rd, at Brockwell Park, Herne Hill, S.E., starting at 10.30 a.m.

The regatta will be run under M.P.B.A. rules and a cordial invitation is made to all clubs to join us in the various events.

Hon. Secretary: W. R. COOK, 103, Engleheart Road, Catford, S.E.6.

Model Power Boat Association

International model power boat racing to be held at Allestree Park, Derby, on August 12th and 13th.

Saturday, August 12th. Hispano-Suiza Cup (holder George Stone, Gt. Britain) for 10-c.c. hydroplanes.

Sunday, August 13th. Ford Meccanic Club Cup (holder George Stone, Gt. Britain) for all classes of hydroplanes up to 30 c.c.

It is also hoped to incorporate an international team race and a handicap prize over the two days' racing. Six Swiss and three French competitors have promised to attend, including Gems Suzor and Jean-Louis Chevrot.

Joint organisers: E. CLARE, 97, Upper Dale Road, Derby; G. H. STONE, 68, Darby Crescent, Sunbury-on-Thames, Middx. Derby Model Racing Club.

Guildford Model Yacht, Power Boat and Engineering Society

The annual M.P.B.A. regatta will be held on Sunday, July 30th, at Stoke Park Pond, Guildford, commencing at 11 a.m.

The events include nomination, steering, "A" class (600 yds.), "B" class (300 yds.), "C" and "C" restricted (300 yds.).

Hon. General Secretary: W. E. ROBERTS, 52, Saffron Platt, Tilehouse Estate, Guildford.

Harrow and Wembley Society of Model Engineers

A novel subject for the society was the working and operation of punched card accounting machinery in a talk by Mr. S. J. Hobson.

Mr. Hobson, a member of the society, is a statistics expert at Scotland Yard and with the aid of drawings and photographs he showed how these machines are used in classifying recorded information in order to produce valuable statistics regarding crime, accidents, etc.

Questions naturally tended to refer to the solution of crime and Mr. Hobson told some interesting stories of how the resources of Scotland Yard are used to assist the local police to carry out their work.

The work of building the new railway track in the L.M.S. Sports Federation ground at Headstone Lane, has begun in earnest and is progressing very satisfactorily. Although completion can hardly be anticipated until the spring of 1951, it is hoped to have part of the track working by the end of this summer.

There will be no society meetings at Heathfield School during the months of July and August.

Hon. Secretary: J. H. SUMMERS, 34, Hillside Gardens, Northwood.

North Devon Society of Model Engineers

An exhibition will be held at the West Regional Auto Ltd. Showrooms, Newport Road, Barnstaple (by kind permission of the management), August 16th, 17th, 18th, 19th, 11 a.m.-9 p.m.

Any person interested in exhibiting, please communicate with the Hon. Exhibition Secretary, J. D. GIFFORD, 30, Queen Street, Barnstaple, Devon.

The Bristol Society of Model and Experimental Engineers

The following meetings will commence promptly at 7.30 p.m. at the Y.W.C.A., Gt. George Street, Bristol, 1.

Saturday, August 5th. Club day, also get-together at Canford Park, 2.30 to 7 p.m.

Wednesday, August 16th. "I.C. Topics," by Messrs. Kerswell, Kingston and Noble.

Saturday, September 2nd. Annual general meeting. Will all members endeavour to attend?

Wednesday, September 13th. "Experiences of a Lifeboat Engineer," by Mr. A. Curnow.

Passenger-carrying dates at Canford will be held on the following Saturdays:—

July 22nd, August 5th, August 19th, August 26th, September 9th, September 23rd, September 30th.

Hon. Secretary: F. C. WATTS, 7, Fifth Avenue, Bristol, 7.